Internal Monitoring Report

Policy #: O-2B Water Quality **Date**: November 24, 2020

Policy Language:

Madison Water Utility consumers will receive high quality water that meets or is better than all primary and secondary drinking water standards, including their public notification requirements, and complies with board-adopted water quality goals, incorporated by attachment.

The Madison Water Utility recognizes that drinking water standards are subject to revision and that new compounds of concern will be determined. This dynamic is a result of health studies being conducted by health organizations and government agencies on the state, national and international level. The technology to quantify compounds at increasingly minute levels is constantly improving.

The Madison Water Utility shall maintain and promulgate a Watch List of compounds of concern by unit well of compounds that are increasing and may approach the primary and secondary drinking water standards. The Watch List shall identify which wells require action.

CEO's interpretation and its justification:

Few things are more vital to a community than the availability of high quality drinking water. It promotes public health, public safety, and the economic interests of our community. To that end, the water utility will consistently deliver water that meets the primary, health-based drinking water standards, the secondary (aesthetic) standards, and the additional policy goals established by the Board.

Water Utility Board Procedural Guideline GUIDE 8 – Executive Summary of Water Quality Treatment Policies – establishes monitoring requirements and the utility's approach for responding to increasing contaminant levels. Generally, the policy establishes two thresholds – one when a contaminant exceeds 50% of a maximum contaminant level (MCL), secondary MCL, or other numerical guideline, and two when it surpasses 80% of this mark. The first triggers increased monitoring and an investigation into treatment alternatives, operational changes, or other actions to reduce contaminant levels while the second leads to implementation of a mitigation strategy.

The policy applies to any contaminant, regulated or not, that is capable of impairing the health, safety, or aesthetic quality of drinking water. Utility staff will remain vigilant in following developments related to currently unregulated and emerging contaminants like pharmaceuticals, endocrine disruptors, per and polyfluoroalkyl substances [PFAS], chromium(VI), and 1,4 dioxane that may pose challenges in the future.

The utility will use multiple communication methods to adequately inform consumers of the safety and quality of their drinking water including the federally required Consumer Confidence Report (CCR), the water utility website, e-mail distribution lists, neighborhood listservs, citizen meetings, and through direct staff contact in the field and office.

Data directly addressing the CEO'S interpretation:

<u>Contaminants with a primary MCL, Action Level or Enforcement Standard</u>

Coliform Bacteria - Between June and September 933 water samples were collected from routine monitoring points in the system. This number of samples far exceeds the monthly minimum requirement of 150 samples. No sample tested positive for coliform bacteria. Twenty-one untreated (non-chlorinated) well samples also were collected during this reporting period. All were found to be free of coliform bacteria.

Inorganic Compounds – Twenty-one wells were tested in the monitoring period for a suite of water quality parameters (conductivity, alkalinity, hardness) and inorganic chemicals. None of the following contaminants was found at any well – antimony, beryllium, cadmium, mercury, or nitrite. Except for barium and nitrate, detections of other contaminants were at low levels, often just above the level of detection. Arsenic was found at thirteen wells and thallium at four. Total chromium measured at levels similar to those found in previous years. **Table 1** summarizes the range of results for each regulated inorganic chemical while complete test results follow as an attachment. With the exceptions of sodium and chloride (discussed later), the 2020 results do not deviate significantly from results in previous years.

Table 1. Summary of Regulated Inorganic Chemical Detections

Parameter	MCL	Units	Detections	Minimum	Median	Maximum
Antimony	6	µg/L	0	<0.32	<0.32	<0.32
Arsenic	10	µg/L	13	<0.14	0.17	0.52
Barium	2000	µg/L	21	7.2	20	64
Beryllium	4	µg/L	0	<0.06	<0.06	<0.06
Cadmium	5	µg/L	0	<0.12	<0.12	<0.12
Chromium	100	µg/L	8	<0.58	<0.58	2.2
Mercury	2	µg/L	0	<0.015	<0.015	<0.015
Nickel	100	µg/L	15	<0.50	0.70	2.2
Nitrate	10	mg/L	15	<0.029	0.71	3.8
Nitrite	1	mg/L	0	<0.036	<0.036	<0.036
Selenium	50	µg/L	7	<0.47	<0.47	1.0
Thallium	2	µg/L	4	<0.1	<0.1	0.17

Lead and Copper Rule – Madison Water Utility is currently on reduced monitoring for lead and copper. To comply with the rule, the water utility coordinates the collection of samples from fifty single-family homes once every three years. Each home is approved by the DNR after the utility confirms the age of the house, the presence of copper pipes, and determines that no treatment (filtration or water softening) occurs on the water. After collecting samples and analyzing the test results, the utility must determine the 90^{th} percentile lead and copper levels, and compare those to the action level for each – 15 µg/L for lead and 1300 µg/L for copper. The 90^{th} percentile is the level at which ten percent of the sample results are higher than this value and ninety percent are lower. Fifty-one samples were collected in 2020. The 90^{th} percentile lead level was 3.6 µg/L and the 90^{th} percentile copper level was 176 µg/L. These results, which are similar to levels reported in previous monitoring periods following the completion of the lead service line replacement program, confirm that once sources of lead have been removed corrosion is not a significant issue in Madison.

In addition to residential tap testing, the Rule requires monitoring of Water Quality Parameters at wells and representative locations in the distribution system (total coliform sample locations). These parameters include chlorine residual, temperature, pH, alkalinity, conductivity, hardness, and chemicals like iron, manganese, chloride, and sulfate which influence corrosion and the stability of chemical scales. The results establish the normal operating conditions under which corrosion is being controlled in our system. Results are included in the appendix.

Volatile Organic Compounds – Between June and October, eight wells were sampled for VOCs. Six are tested once a quarter; they include Wells 6, 7, 9, 11, 14 and 18. PCE is the most commonly detected VOC. It was found at all six wells with levels ranging from 0.33 to 2.1 µg/L. The maximum contaminant level (MCL) for PCE is 5 µg/L. PCE levels are mostly stable at all six wells; however, small increases have been observed at Wells 6, 7 and 18 in recent months or years. A detection summary for each well is shown in **Table 2**. No VOCs, except for disinfection by-products, were detected at the other two wells tested – Well 8 and Well 27.

Low levels of ethyl benzene and xylene have been detected intermittently at Well 9 since 2018, after the painting of the interior surface of the reservoir. The two chemicals were found in July but not October, neither was detected in January, and only xylene was found in April testing. Higher temperatures appear to promote the transfer of these chemicals into the water.

Table 2. Summary of VOC Detections – June 2020 to October 2020

Well		#6	#7	#9	#11	#14	#18
Number of Samples		2	2	2	2	2	2
VOC Contaminant	**MCL (µg/L)**	**Maximum Test Result (µg/L)**					
1,2-Dichloroethylene (cis)	70	<0.35	<0.35	<0.35	**0.41**	<0.35	<0.35
Ethyl benzene	700	<0.27	<0.27	**0.55**	<0.27	<0.27	<0.27
Tetrachloroethylene (PCE)	5	**1.2**	**0.89**	**1.8**	**0.69**	**0.33**	**2.1**
Trichlorofluoromethane	--	<0.29	<0.29	<0.29	**0.71**	<0.29	<0.29
Xylene	10,000	<0.88	<0.88	**3.6**	<0.88	<0.88	<0.88

Radium – Radium monitoring follows the guidance provided in GUIDE 8. In 2020, all wells were sampled at least once to satisfy the DNR monitoring requirement, which mandates testing at least once every three years. Some wells, including Wells 19 and 27, have higher radium levels and are tested once a quarter. Others wells are tested annually when combined radium is between 2.5 and 4.0 pCi/L. **Table 3** below summarizes the radium results for samples collected year to date. Radium results are highest for wells that exclusively draw water from the lower Mt. Simon aquifer.

The utility's Capital Improvement Plan includes construction of an iron and manganese filter at Well 19, currently scheduled for construction in 2023, which also is expected to reduce the radium level at the well.

Table 3. Combined Radium (226 + 228) Results Measured in pCi/L.

	Number of Samples	Results	Annual Average of Quarterly Samples
Well 6	1	1.2	n/a
Well 7	2*	2.5 – 4.8	n/a
Well 8	2*	3.0 – 4.0	n/a
Well 9	1	2.0	n/a
Well 11	1	1.3	n/a
Well 12	1	1.3	n/a
Well 13	2*	1.3 – 1.4	n/a
Well 14	1	1.1	n/a
Well 16	1	1.9	n/a
Well 17	1	1.7	n/a
Well 18	1	0.8	n/a
Well 19	6*	3.0 – 5.0	**3.9**
Well 20	1	2.4	n/a
Well 24	2*	2.8 – 2.9	n/a
Well 25	1	1.8	n/a
Well 26	1	1.2	n/a
Well 27	6*	2.8 – 4.1	**3.7**
Well 28	2*	2.9 – 4.1	**4.1**
Well 29	1	1.8	n/a
Well 30	2*	2.5	n/a
Well 31	2*	0.9 – 1.4	n/a

* Includes duplicate samples

Synthetic Organic Compounds – Pesticides and other synthetic chemicals typically are tested at each well once every six years. Low-level detections of atrazine at Well 29 and metolachlor at Well 14 in 2017 resulted in semi-annual monitoring in 2020 at these wells. A total of thirty-seven chemicals were tested. Atrazine was found at both wells at levels ranging from 0.03 to 0.04 parts per billion (ppb) while metolachlor was found at Well 14 at the 0.01 ppb level. These levels are just above the detection limits and well below the maximum contaminant level (MCL) for each.

Contaminants with a secondary MCL

Iron and Manganese - Monthly well samples are collected when iron and manganese are elevated. During the period from June to October, all five samples from Well 8 exceeded the secondary MCL for iron [0.3 mg/L] while all other wells met the iron and manganese standard [50 µg/L] during each month of testing. Results are shown in **Tables 4 and 5**.

Filters at Well 7, Well 29, and Well 31 continue to show significant iron and manganese reductions. Levels typically are reduced by 92-98%. Test results are shown in **Tables 4 and 5**. In all cases, iron was reduced to <0.05 mg/L and in many cases to 0.01 mg/L or lower. Manganese was regularly lowered to below the detection limit, <2.0 µg/L.

Seven wells have iron levels above the Board Policy level [0.1 mg/L] that mandates treatment. These wells include 8, 17, 19, 24, 27, 28 and 30. Six of these wells, not including Well 30, also exceed the Board Policy level for manganese [20 µg/L], the level above which treatment is required.

Table 4. Monthly Iron Test Results, in mg/L

Source	Jun	Jul	Aug	Sep	Oct
Well 7 – filtered	0.02	0.01	0.03	0.04	0.01
Well 8	**0.43**	**0.46**	**0.49**	**0.53**	**0.51**
Well 17	0.11	0.11	0.12	0.12	n/s
Well 19	0.18	0.20	0.18	0.20	0.20
Well 24	0.18	0.20	0.20	0.20	0.22
Well 26 – deep well	0.01	0.01	0.01	<0.01	0.02
Well 27	0.10	0.16	0.14	0.12	0.14
Well 28	0.17	0.16	0.17	0.18	0.18
Well 29 – filtered	<0.01	0.02	<0.01	<0.01	0.01
Well 30	0.18	0.19	0.19	0.19	0.18
Well 31 – filtered	<0.01	0.01	<0.01	<0.01	0.01

Table 5. Monthly Manganese Test Results, in µg/L

Source	Jun	Jul	Aug	Sep	Oct
Well 7 – filtered	<2.0	<2.0	<2.0	2.1	<2.0
Well 8	49	48	49	48	49
Well 17	34	30	33	31	n/s
Well 19	39	43	38	42	37
Well 24	26	25	28	29	29
Well 26 – deep well	<3.9	<3.9	11	3.9	18
Well 27	34	32	34	35	33
Well 28	22	22	23	22	22
Well 29 – filtered	<2.0	<2.0	<2.0	<2.0	<2.0
Well 30	13	13	13	13	13
Well 31 – filtered	<2.0	<2.0	<2.0	<2.0	<2.0

Iron and manganese monitoring also takes place in the distribution system at all coliform sample locations. Test results, summarized in **Table 6**, show iron and manganese did not exceed the established benchmarks during this period and that over 95% of the samples are below one-half the policy goals. The results demonstrate effective control and management of manganese and iron in the distribution system through either wellhead treatment or our water main flushing practices.

Table 6. Summary of iron and manganese levels in the distribution system.

Manganese, µg/L

	Jun - Oct	2020
Policy Goal	**50**	**50**
Median	<2.0	<2.0
Average	3.6	3.8
95th Percentile	***13***	***16***
Maximum	18	24
Number of Samples	58	115
>50	0	0

Iron, mg/L

	Jun - Oct	2020
Policy Goal	**0.3**	**0.3**
Median	0.02	0.02
Average	0.03	0.03
95th Percentile	***0.12***	***0.15***
Maximum	0.18	0.20
Number of Samples	58	115
>0.3	0	0

Chloride – Twice monthly chloride monitoring continues at Well 14. Ten samples were collected between May and September with chloride ranging from 150 to 170 mg/L, compared to the secondary MCL of 250 mg/L. Well 14 is the only Madison well with chloride above 100 mg/L; however, some wells (6, 9, 11, and 16) have experienced considerable increases in chloride in recent years.

Progress on investigating the influence of stormwater runoff at Spring Harbor and water quality observed at Well 14 has been slowed by staffing changes at the Water Utility and impacts due to Covid-19. A preliminary review suggests a strong influence of stormwater drainage on Well 14 water quality. Additional study currently is planned for 2021.

Water utility staff continue to work with regional partners to help raise awareness on the issue of chloride contamination of the lakes and our ground and drinking water resources. The partnership helped develop and implement a Winter Salt Certification program emphasizing training, equipment calibration, and record keeping. Outreach efforts promote the training workshops that are a prerequisite to individual or organization-level certification.

<u>Unregulated and Emerging Contaminants</u>

Per and Polyfluoroalkyl Substances [PFAS] – The Water Utility continues to proactively monitor for PFAS in all Madison wells. In 2020, testing was completed in May. Test results were similar to previous years; however, all wells had at least one PFAS detected this year. A higher frequency of PFAS detections may reflect the use of more sensitive analytical techniques with very low detection limits. Alternatively, laboratory cross-contamination or the uncertainty of results below the reporting limit or close to the detection limit may cause false positive results.

Results from sixteen of twenty-one wells showed that PFOA, PFOS, or both PFOA & PFOS were found at levels ranging from an estimated 0.1 to 1.8 ng/L (parts per trillion, ppt). The maximum combined level of PFOA + PFOS was found at Well 16 and measured 3.4 ng/L. This level compares to 20 ng/L for combined PFOA + PFOS, the amount the Wisconsin DNR is currently considering for a drinking water standard based on Wisconsin DHS recommendations. **Figure 1** on the next page shows how the results at each well compare to this proposed safety standard.

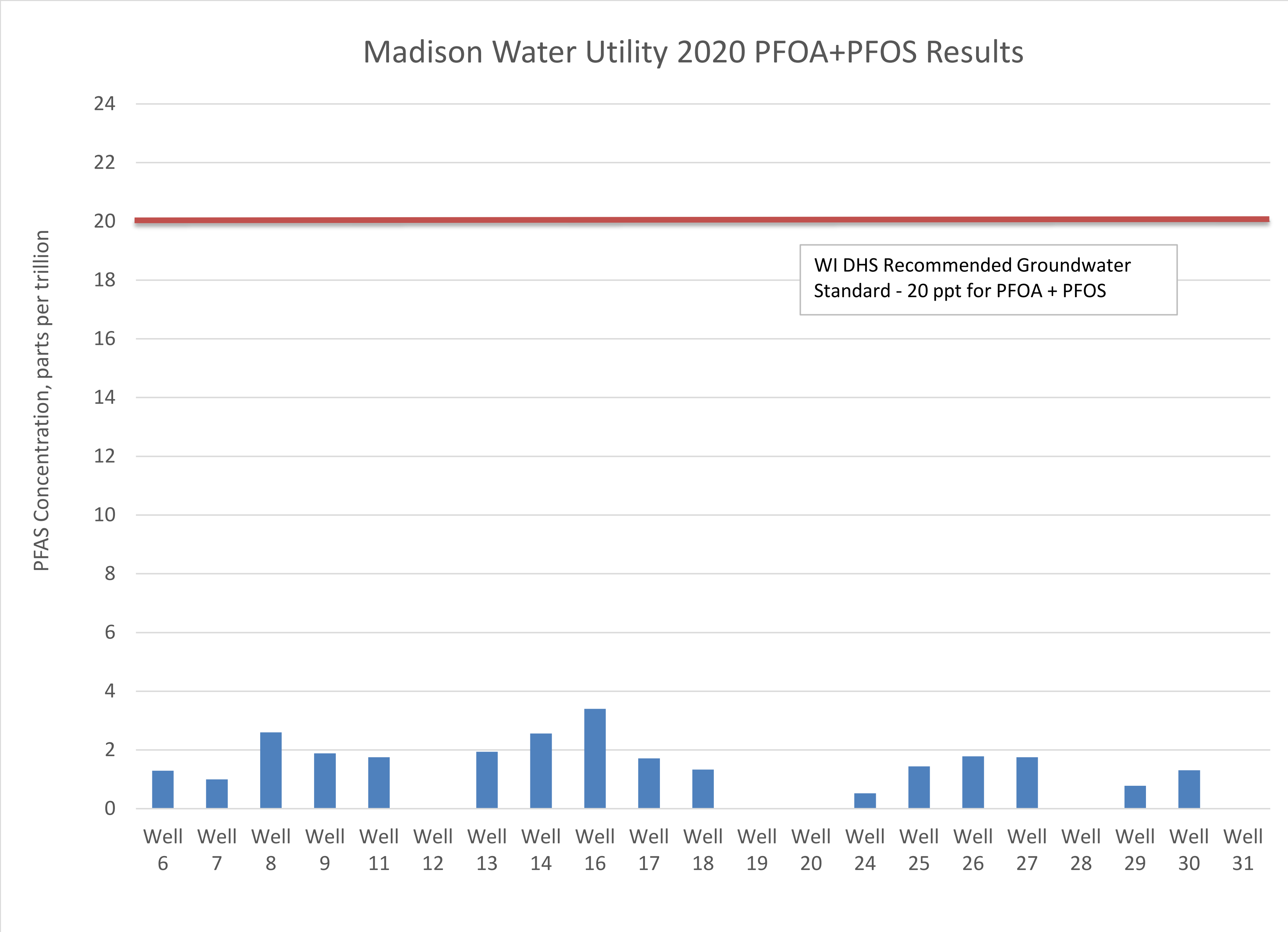

Figure 1. Combined PFOA + PFOS Test Results (2020 Data) For Each Madison Municipal Well

About fifteen different PFAS chemicals have been identified in at least one Madison well. Besides PFOA & PFOS, the most commonly detected PFAS include PFBA and PFHxS, which have been found in nearly all wells. The maximum level of PFBA occurs in Well 9 and tests at about 37 ng/L; the highest amount of PFHxS was found at Well 14 and measured 6.4 ng/L. A 2020 PFAS detection summary is included as an attachment to this report.

While there are thousands of different types of PFAS chemicals, analytical techniques to detect and quantify them are available for a small number of them. Studies evaluating the potential toxicity of PFAS chemicals are even more limited. Toxicologists from the Wisconsin DHS have reviewed these studies and recommended values for potential groundwater standards for eighteen PFAS – see **Table 7**. The table also reports the maximum level of each individual PFAS found in any Madison well in 2020 and the highest level found at Well 15 in previous years. All PFAS levels in Madison wells, including Well 15 (which was temporarily taken out of service over PFAS concerns), are below the recommended standard for each PFAS evaluated by WDHS.

Table 7. Comparison of Madison PFAS results to recommended standards.

PFAS	WI DHS recommendation (ng/L or parts per trillion)	Maximum Level (2020)	Source with Max Level	Well 15 (2019)
PFOA	20[#]	1.8	UW 14	6.1
PFOS	20[#]	1.8	UW 16	5.9
FOSA	20[#]	4.4*	UW 31	ND
NEtFOSE	20[#]	1.5	UW 12	ND
NEtFOSA	20[#]	ND	--	ND
NEtFOSAA	20[#]	ND	--	ND
PFBA	10000	37	UW 09	3.0
PFBS	450000	1.7	UW 14	3.4
PFHxA	150000	2.2	UW 14	6.2
PFHXS	40	5.0	UW 14	21
PFNA	30	ND	--	ND
PFDA	300	ND	--	ND
PFUnA	3000	ND	--	ND
PFDoA	500	0.56	UW 06	ND
PFTeA	10000	0.52	UW 06	ND
PFODA	400000	na	--	na
DONA	3000	ND	--	ND
GenX	300	ND	--	ND
	[#] Recommended that combined level of six PFAS (PFOA, PFOS, FOSA, NEtFOSE, NEtFOSA, & NEtFOSAA) be below 20 ng/L			
	* Present in laboratory method blank; may reflect cross-contamination at lab			
	ND = not detected			
	na = not analyzed			

A Feasibility Study is currently underway at Well 15. This study will evaluate potential treatment options (activated carbon and ion exchange resin) to remove PFAS, and estimate potential equipment and long-term operating costs for a PFAS removal system. Two industry-leading water treatment companies are running bench-scale tests to estimate treatment effectiveness of activated carbon on PFAS and VOC removal. Results of this study are expected in early spring 2021. Upon completion, the water utility team will perform a business case evaluation to determine how to proceed at Well 15 in a manner that addresses the water quality and water supply issues related to PFAS.

1,4-Dioxane – During this monitoring period, one sample was collected at Well 11 and tested for dioxane; it measured 0.31 µg/L. Since 2018, the level of dioxane has varied from 0.29 – 0.41 µg/L, with an average of 0.34 µg/L. Five other wells (9, 14, 15, 17, and 18) are tested once every three years, most recently in 2018, and will be tested again in 2021 based on previous detections of 1,4-dioxane.

Chromium-6 – Also during the monitoring period, five wells were tested for chromium-6, or hexavalent chromium. In accordance with GUIDE 8, four wells (6, 13, 14, and 16) are routinely tested since the chromium level regularly measures above 1 µg/L. There is no current regulatory standard for chromium-6; however, the MCL for total chromium is 100 µg/L. All Madison wells will be re-tested in 2021 for hexavalent chromium.

Sodium - In accordance with GUIDE 8, monthly sodium testing continues at Well 14. Ten samples were collected between May and September with samples ranging from 52 to 62 mg/L sodium. The average level is 60 mg/L. Sodium levels above 20 mg/L can be concerning for individuals on severe sodium-restricted diets. Health officials recommend these individuals account for sodium in drinking water when calculating their daily sodium intake.

Water Quality Watch List

The Water Quality Watch List has been updated with current test results for inorganic, organic, radiological, and unregulated contaminants. Any changes reflect new data collected in 2020.

Water Quality Technical Advisory Committee

The committee met twice virtually, in August and October, since the last monitoring report. At the August meeting, the topics focused on radium at Well 19, PFAS testing options and results, and a brief discussion of Covid-19 impacts on water utility operations. Researchers from UW-Madison and the Wisconsin State Laboratory of Hygiene made presentations followed by a facilitated question and answer period. The October meeting was dedicated to a discussion on fluoride – current utility practices, benefits of community water fluoridation, and potential behavioral, developmental & cognitive risks associated with community fluoridation. Meeting notes are included as attachments to this report.

At the next two meetings, the committee will hear from health officials from Public Health Madison Dane County, Wisconsin Department of Health Services Oral Health Program, and National Toxicology Program (NTP). A panelist who prepared the NTP report, *Systemic Review of Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects*, is expected to participate after a committee of the National Academy of Sciences, Engineering, and Medicine completes its peer review of that report.

Virtual (Zoom) meetings are currently scheduled for January 11, April 12, and July 12 to discuss community fluoridation, with a goal of making a recommendation to the Water Board on the utility's fluoridation policy by late summer 2021.

Attachments:

Water Quality Watch List
Water Quality Technical Advisory Committee Notes – August 2020
Water Quality Technical Advisory Committee Notes – October 2020
Water Quality Test Results
- Inorganics
- Water Quality Parameters
- PFAS Detection Summary
- Volatile Organics

MADISON WATER UTILITY
WATER QUALITY WATCH LIST

Organics - Regulated

Contaminant	Maximum*	Units	MCLG	PAL	MCL	Detects Below PAL%	Watch List	Action Plan	Reference
Atrazine	0.04	µg/L	3	0.3	3	#14, #29	none		NR 809.20
1,2-Dichloroethane	0.1	µg/L	zero	0.5	5	#17	none		NR 809.24
1,2-Dichloroethylene (cis)	0.57	µg/L	70	7	70	#8, #9, #11, #27	none		NR 809.24
Ethylbenzene	0.7	µg/L	700	140	700	#9	none		NR 809.24
Tetrachloroethylene [PCE]	3.4	µg/L	zero	0.5	5	#27	#6, #7, #9, #11, #14, #18	Quarterly Monitoring	NR 809.24
Toluene	0.2	µg/L	1000	160	1000	#9, #31	none		NR 809.24
1,1,1-Trichloroethane	0.1	µg/L	200	40	200	#9, #18	none		NR 809.24
Trichloroethylene [TCE]	0.42	µg/L	zero	0.5	5	#11, #14, #18	none		NR 809.24
Xylene, Total	4.5	µg/L	10000	400	10000	#9, #31	none		NR 809.24

* Maximum detection observed at any Madison well from 2016 through 2020 % Detected in at least one sample collected from 2016 through 2020

Organics - Unregulated

Contaminant	Maximum*	Units	HAL	PAL	ES	Detects Below PAL%	Watch List	Action Plan	Reference
Chloromethane	0.72	µg/L	n/a	3	30	#18	none		NR 140.10
1,4-Dioxane	0.41	µg/L	0.35~	0.3	3	#9, #14, #15, #18	#11	Semi-Annual Monitoring	NR 140.10
Metolachlor	0.01	µg/L	n/a	10	100	#14	none		NR 140.10
PFAS: Combined / PFOA + PFOS	0.056 / 0.012	µg/L	0.07^	0.002^#	0.02^#	#6, #7, #9, #11, #13, #17, #18, #24, #25, 26, #27, #29, 30	#8, #14, #15, #16	Annual Monitoring; Feasibility Study - #15	WI DNR Rulemaking
Trichlorofluoromethane	1.1	µg/L	n/a	698	3490	#11	none		NR 140.10

* Maximum detection observed at any Madison well from 2016 through 2020 % Detected in at least one sample collected from 2016 through 2020 ~ 10^{-6} Cancer Risk Level ^ PFOA + PFOS # Proposed

Radionuclides (2018 - 2020)

Contaminant	Maximum	Units	MCLG	Watch	MCL	Wells with Detects	Watch List	Action Plan	Reference
Gross alpha	12	pCi/L	zero	5	15	All Wells	#7, #8, #18, #19, #24 #25, #27, #28, #30, #31	Annual or Quarterly Monitoring	NR 809.50
Gross beta	13	pCi/L	zero	10	50	All Wells	#19, #27, #28		NR 809.50
Combined Radium	5.9	pCi/L	zero	2.5	5	All Wells	#7, #8, #19, #24 #27, #28, #30	Annual or Quarterly Monitoring	NR 809.50

ES - Enforcement Standard (NR 140 - Groundwater Quality) **HAL** - Health Advisory Level **MCL** - Maximum Contaminant Level Legal Limit **MCLG** - MCL Goal (Public Health Goal) **PAL** - Preventive Action Limit (NR 140 - Groundwater Quality)

MADISON WATER UTILITY
WATER QUALITY WATCH LIST

Inorganics - Regulated

Substance	Maximum*	Units	MCLG	PAL	MCL	Detects Below PAL	Watch List	Action Plan	Reference
Arsenic	0.52	µg/l	zero	1	10	#6, #8, #9, #11, #13, #14, #17, #19, #24, #26, #27, #28, #30	none		NR 809.11
Barium	64	µg/l	2000	400	2000	All Wells	none		NR 809.11
Chromium, Total	2.2	µg/l	100	10	100	#6, #9, #11, #13, #14, #!6, #20, #25	none		NR 809.11
Nickel	2.2	µg/l	100	20	100	#6, #7, #8, #9, #11, #12, #13, #14, #16, #17, #19, #26, #27, #28, #29	none		NR 809.11
Nitrogen-Nitrate	3.8	mg/l	10	2	10	#7, #12, #18, #20, #24, #25, #27, #29	#6, #9, #11, #13, #14, #16, #26	Annual Monitoring	NR 809.11
Selenium	1.0	µg/l	50	10	50	#6, #9, #11, #13, #14, #25, #29	none		NR 809.11
Thallium	0.17	µg/l	0.5	0.4	2	#11, #17, #19, #27	none		NR 809.11

* Based on 2020 annual test data

Inorganics - Unregulated

Substance	Maximum*	Units	MCLG	Watch	SMCL	Wells with Detects	Watch List	Action Plan	Reference
Chloride	160	mg/l	n/a	125	250	All Wells	#14	GW Investigation; Mitigation (20XX)	NR 809.70
Iron	0.46	mg/l	n/a	0.1	0.3	All Wells	#8, #17, #19, #24, #27, #28, #30	Install Filtration: Well #8 (2028) Well #19 (2023) Well #24 (20XX) Well #28 (20XX) Well #30 (20XX)	NR 809.70
Manganese	48	µg/l	n/a	20	50	#11, #12, #13, #18, #25, #30	#8, #17, #19, #24, #27, #28		NR 809.70
Sodium	60	mg/l	n/a	20	n/a	All Wells	#6, #9, #11, #14, #16, #27	Annual Monitoring	EPA DWEL
Sulfate	38	mg/l	n/a	125	250	All Wells	none		NR 809.70
Zinc	13	µg/l	n/a	2500	5000	#8, #12, #16, #17, #24, #26, #27, #28	none		NR 809.70

* Based on 2020 annual test data

DWEL - Drinking Water Equivalency Level **MCL** - Maximum Contaminant Level (Legal Limit) **MCLG** - MCL Goal Public Health Goal **PAL** - Preventive Action Limit (NR 140 - Groundwater Quality) **SMCL** - Secondary MCL (Aesthetic Guideline)

Water Quality Technical Advisory Committee

Meeting Notes
Virtual Conference (Zoom)
August 24, 2020 – 5:00 p.m.

Attending: Henry Anderson, Janet Battista, Joe Demorett, Joseph Grande, Greg Harrington, Jocelyn Hemming, Gary Krinke, Al Larson, Isabel Marrah, Sharon Long

Absent: Amy Barrilleaux, Tom Heikkinen

Guests: Matt Ginder-Vogel (UW–Madison), Maddie Mathews (UW–Madison), Martin Shafer (WI State Lab of Hygiene)

1. Agenda Repair/Announcements/Administration

- Announced it was Isabel's last meeting, thanked her for invaluable help (including technical support during first virtual meeting) and best wishes as she is leaving City employment
- Next meeting is tentatively scheduled for Monday, October 12 @ 5 p.m.; then Monday, January 11, 2021

2. Review of Meeting Notes

- Motion to approve by HA, seconded by GH; no discussion, January 13, 2020 notes adopted as written.

3. Radium Study Results – Well 19 (presented by M. Ginder-Vogel & M. Mathews)

- Over large geographic scale, radium levels appear to be increasing over time; data is spotty and not consistently gathered from same wells – differences could be caused by well construction, operational changes (pumping), drawdown, or other factors including which wells were sampled
- Elevated radium correlates with higher TDS (ion content) typical in unconfined aquifers, and anoxia or low oxygen environments where iron/manganese oxides less favored to form, producing fewer sorption sites for radium attachment; low oxygen yields higher radium that is evident in Madison wells.
- Radium levels at Well 19 creeping up towards MCL; behavior appears different between 226 & 228
- Counting method (standard method) produces higher radium results and error compared to ICPMS; however, samples subject to analysis by ICPMS were field filtered while counting method samples not
- ICPMS showed consistency in combined radium around 3 pCi/L; no real difference observed in regions of the borehole; results do not support hypothesis that microbial growth produces reducing conditions that temporarily result in short term radium increases; counting method showed 4 pCi/L combined radium
- Comparing ICPMS & counting method, ICPMS is more precise and accurate – counting atoms versus number of decay events. Precision of counting method can be improved by increasing sample volume but is insufficiently sensitive to measure small changes in radium levels in the range of regulatory limits

4. PFAS Testing Options & Results (presented by J. Grande and M. Shafer)

- Presentation of MWU 2020 PFAS results which showed detection of at least one PFAS in every well; however, some data quality questions arose due to, for example, FOSA detection in every well and the method blank (theoretically PFAS-free water).
- PFOA + PFOS detections ranged from below method detection limits to 3.4 ng/L relative to the proposed health-based WI groundwater standard of 20 ng/L.
- PFBA, a short chain PFAS, was universally detected mostly at low levels (<1 to 4 ng/L); however, it measured 37 ng/L and accounted for nearly 80% of the PFAS load at Well 9
- Mixtures of up to ten different PFAS were detected with the combined PFAS concentration below 10 ng/L except for Wells 6, 9, 11, 14, and 16. Only Wells 9 & 14 measured above 15 ng/L combined PFAS.

- There are a wide range of PFAS analytical methods (some standardized others more research-focused) that analyze targeted and non-targeted PFAS chemistries – compounds that include C-F bonds.
- Three categories include targeted PFAS analysis, screening for non-targeted known PFAS chemistries, and discovery of non-targeted unknown PFAS.
- Standard Method 537.1 relies on SPE (SDVB), with poor affinity for some PFAS chemicals; methods for other environmental media have direct injection with external standards.
- Limitations of analysis include few certified external references, high precision but low accuracy, and not account for linear vs. branched isomers
- Low detections limits (0.1 – 0.2 ng/L) now can be achieved with about three dozen targeted PFAS
- Gaining confidence in non-standard methods (ISO and modified ISO method, for example) achieved through QC checks including blanks, spikes, and internal standards – important QA metrics – and duplicate or sequential sampling. ISO method is a good, effective test method.
- Field, trip, and method blanks essential to determining data quality. For example, were sample bottles contaminated? Evaluating analytical performance can be more challenging.
- Duplicates recommended with every ten samples; it will help to assess analytical error.
- Any plans to reduce sampling frequency? Will sample again in 2021 and then determine whether to continue with annual sampling at all wells or more frequent testing at some and less frequent at others.

5. COVID-19 Impacts on Utility Operations

- Water Quality – temporarily suspended cross connection inspections – requested photo documentation or paperwork showing that annual performance testing for RP/DC assemblies are complete; discontinued total coliform sampling some routine sites due to no/reduced water use or site access issues
- Water Supply – sequestered Water Operators to SCADA room and limited access to other staff; observed initial reductions in demand following stay at home orders, residential use increased but more than offset by large (15-20%) reduction in commercial, industrial, and public authority accounts; more recently water demand has increased with warmer and drier weather
- Operations – buildings are closed to the general public, many office staff are working from home (even some field staff were given training and remote work assignments to temporarily work from home), only non-routine & emergency meter changes are being scheduled, all field staff are traveling solo in vehicles

6. Future Agenda Items

- Groundwater enforcement standards discussion: chromium (VI) and 1,4 dioxane
- Leaky sewers, exfiltration, and PFAS transport discussion
- Fluoride policy review

7. Adjournment

The next meeting tentatively is planned for Monday, October 12 from 5 to 6:30 p.m. It will be a virtual meeting.

Water Quality Technical Advisory Committee - DRAFT

Meeting Notes
Virtual Conference (Zoom)
October 12, 2020 – 5:00 p.m.

Attending: Henry Anderson, Janet Battista, Joseph Grande, Greg Harrington, Jocelyn Hemming, Al Larson, Sharon Long, Dan Rodefeld

Absent: Gary Krinke, Amy Barrilleaux, Joe Demorett, Tom Heikkinen

Guests: Jeff Lafferty (Public Health Madison Dane County), Russ Dunkel (WI Dept of Health Services), Robbyn Kuester ((WI Dept of Health Services), Dr. Beth Neary (local pediatrician)

1. Agenda Repair/Announcements/Administration

- Next meeting tentatively scheduled for Monday, January 11, 2021.
- Additional 2021 meeting dates announced: April 12, July 12, and October 11

2. Review of Meeting Notes

- Motion to approve by GH, seconded by SL; no discussion, August 24, 2020 notes adopted as presented.

3. Water Utility Board Fluoridation Policy Review

- JG opened with introductory remarks about WUB resolution asking for a recommendation on Madison's fluoride policy after the committee reviews the National Toxicology Program report, *Systemic Review of Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects,* when available.
- Briefly described the history of community water fluoridation in Madison, the adopted fluoride policy, and fluoride monitoring results
- History – Community water fluoridation in Madison, WI dates to 1948. The Water Utility Board adopted a formal fluoridation policy in 2009. Between 1948 and 2009, internal standard operating procedures (SOP) and requirements codified in Wisconsin Administrative Code, Chapter NR 811, guided the utility's water fluoridation practices. A change in governance structure of the Water Utility Board in 2010-2011 led to the development of a Policy Book that includes the Fluoridation Policy. The fluoride policy is reviewed a minimum of once every ten years; it was last reviewed in 2014.
- The objective of the policy is prevention of dental caries (end point) through the provision of "optimally-fluoridated" water. The established optimal level balances the benefits of tooth decay prevention with risks of dental fluorosis. The US Department of Health and Human Services lowered its recommendation for optimal fluoride to 0.7 mg/L in 2011. The increased incidence of severe dental fluorosis in children drove this change.

There following questions or topics were identified and discussed:

- The benefits of community water fluoridation were established in the 1950's through 1970's, prior to the advent of fluoridated toothpastes. Does fluoridated water provide an additional benefit beyond that achieved with the use of fluoridated toothpaste or fluoride treatments?
- Some agreement on therapeutic effects but need to acknowledge the uncertainty of fluoride exposure risk. Do current regulations and/or guidelines adequately take into account "Safety Factors" or "Uncertainty Factors"?
- A study published in the National Library of Medicine (National Institutes of Health) reported fluoride levels greater than 0.3 mg/L protect against dental decay. Is a level between 0.3 and 0.7 mg/L fluoride more appropriate? Other studies have reported limited benefits <0.7 mg/L; what benefits might be lost by lowering to 0.3 mg/L? How did the prevalence in caries change when reduced optimal level from 1.1 to 0.7 mg/L?
- Fluoride is "presumed" to be toxic; 5 out of 5 is the highest level of epidemiological confidence

- Community fluoridation provides a benefit beyond other approaches to prevent dental caries
- Two mode of protection – systemic (saliva) and topical (applied directly to teeth)
- Sealants offer limited benefit by protecting chewing surface only, not the smooth surface
- Topically applied fluoride is an effective treatment for dental caries prevention
- Does fluoride benefit the developing fetus? What impact of fluoride on developing fetal brain? Is there a potential for irreversible harm?
- Some studies have suggested fluoride exposure is associated with lower IQ in children. Studies involving children are challenging; difficult to perform IQ tests on 3-4 year olds. Also difficult to rule out potential confounding factors.
- NTP is a comprehensive review of animal and human studies – should view as highly respected and authoritative. Is there sufficient evidence to support neurologic concern? What level of fluoride is acceptable in water? Is 1.5 mg/L the threshold or not?
- We should wait for conclusion of the risk assessment (NTP report). Toxicologists need to weigh in. If fluoride determined to be a neurotoxin, how do we address it? Is the utility contributing to an unnecessary risk?
- NTP review is comprehensive. Looking at individual studies can be misleading. An objective look at individual studies can identify potential confounding factors including socioeconomic status, parent IQ, etc. Need to evaluate entirety of evidence and let research outcomes guide decisions and recommendations and be prepared to change if evidence warrants it.
- Recommend inviting a panelist from the NTP to a future meeting.
- Some researchers reluctant to release original data; potentially raises "red flags"
- Dose is important to toxicity – Warfarin is rat poison but at lower level treats cardiomyopathy; NTP report concludes fluoride neurotoxicity at fluoride levels >1.5 mg/L
- Equity, particularly low income children – breast-fed babies exposed to less fluoride; cavities strongly influenced by diet (e.g. sugar drinks in sippy cups); number of Medicaid patients are rising but 69% reduction in availability of dental services through CHIP, rising health inequity; financial strain makes basics of tooth paste/brush unaffordable, also fewer school programs; impacts of COVID to exacerbate in equity, CWF is equitable regardless of income and will have disproportionate impact on the poor who are already struggling with food access & housing; unable to afford preventive dental care – CWD is the only option available
- Risk balancing – what harm caused by not fluoridating water? Mouthful of silver amalgams that expose individual to lifetime of mercury exposure – for example, which is more harmful mercury exposure or decay of oral health
- Review should stay focus on neurotoxicity; committee should be cognizant of new research
- Fluoride in ionic form is non-reactive (inert), adsorbs to aluminum and does not produce any known by-products (unlike chlorine)
- Member of committee questioned, "Why referred to us and not Public Health or DHS?" Group of technical experts who can objectively review a complex issue, evaluate the science, and make a recommendation to the Board. Public Health officials (state and county) will participate and provide technical knowledge.
- Recommendation – wait until peer review is complete (early 2021)
- Wise decision to wait with the status quo: no recommendation until peer review is complete and member of NTP speaks at a future WQTAC
- Should utility adjust its target level lower (0.3 to 0.7 mg/L)? Beyond the current scope unless the WUB wishes that to be included in the review.

4. Future Agenda Items

- Groundwater enforcement standards discussion: chromium (VI) and 1,4 dioxane
- Leaky sewers, exfiltration, and PFAS transport discussion

5. Adjournment

The next meeting is scheduled for Monday, January 11 from 5 to 6:30 p.m. It will be a virtual meeting.

MADISON WATER UTILITY
WATER QUALITY PARAMETERS - WELLS

PARAMETER	UNITS	Method	Well 6	Well 7	Well 8	Well 9	Well 11	Well 12	Well 13	Well 14	Well 16	Well 17	Well 18
Sample Date			7/8	7/7	7/7	7/7	7/7	7/8	7/7	7/8	7/8	7/7	7/8
pH, Field	s.u.	EPA 150.1	7.13	7.24	7.28	7.37	7.40	7.37	7.26	7.31	7.31	7.31	7.58
Temp, Field	°C	EPA 170.1	11.6	11.4	12.4	16.4	11.4	11.7	11.7	11.2	11.5	12.9	11.7
Alkalinity ($CaCO_3$)	mg/L	SM 2320 B (1997)	310	310	300	320	310	260	310	330	270	250	260
Aluminum	mg/L	EPA 200.7, Rev 4.4	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Calcium	mg/L	EPA 200.7, Rev 4.4	88	76	68	87	83	61	77	100	73	65	64
Chloride	mg/L	EPA 300.0, Rev 2.1	76	20	23	73	66	4.2	43	160	78	40	15
Chlorine, Total	mg/L	DPD Hach	0.44	0.57	0.64	0.43	0.51	0.45	0.46	0.42	0.45	0.53	0.43
Chlorine, Free	mg/L	DPD Hach	0.44	0.46	0.36	0.37	0.46	0.45	0.50	0.38	0.40	0.37	0.37
Conductivity	µmhos / cm	SM 2510 B (1997)	939	705	653	911	889	550	769	1265	843	702	611
Hardness ($CaCO_3$)	mg/L	EPA 200.7, Rev 4.4	420	370	340	420	420	300	380	490	360	340	320
Iron	mg/L	EPA 200.7, Rev 4.4	0.008	0.011	0.460	0.012	0.025	0.013	0.037	0.0083	0.0074	0.110	0.022
Manganese	µg/L	EPA 200.7, Rev 4.4	<2.0	<2.0	48	<2.0	7.3	2.4	2.1	<2.0	<2.0	30	3.7
Sulfate	mg/L	EPA 300.0, Rev 2.1	26	34	17	23	27	9.2	17	23	13	37	17
Turbidity	NTU	EPA 180.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

MADISON WATER UTILITY
WATER QUALITY PARAMETERS - WELLS

Well 19	Well 20	Well 24	Well 25	Well 26	Well 27	Well 28	Well 29	Well 30	Well 31	PARAMETER
7/8	7/8	7/7	7/7	7/8	7/8	7/8	7/7	7/8	7/7	*Sample Date*
7.67	7.46	7.40	7.58	7.35	7.43	7.26	7.37	7.41	7.32	pH, Field
11.4	13.4	13.6	10.9	13.8	12.1	11.2	10.6	11.4	12.6	Temp, Field
270	260	250	290	270	300	270	310	260	330	Alkalinity ($CaCO_3$)
<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	Aluminum
64	55	56	59	68	79	63	71	59	62	Calcium
9.3	2.3	6	3.3	38	43	3.3	7.3	7.6	1.5	Chloride
0.60	0.49	0.46	0.48	0.46	0.45	0.41	0.43	0.48	0.55	Chlorine, Total
0.48	0.49	0.39	0.51	0.46	0.39	0.36	0.37	0.42	0.51	Chlorine, Free
573	526	537	586	705	805	563	614	564	631	Conductivity
300	280	280	330	330	380	300	340	300	350	Hardness ($CaCO_3$)
0.200	0.019	0.200	0.055	0.011	0.160	0.160	0.016	0.190	0.012	Iron
43	<2.0	25	3.5	<2.0	32	22	<2.0	13	<2.0	Manganese
7.7	6.9	13	6.1	13	38	21	10	19	7.9	Sulfate
<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Turbidity

MADISON WATER UTILITY

WATER QUALITY PARAMETERS - DISTRIBUTION

PARAMETER	UNITS	Method	WEST	HSR	SH	HF	JMS	128	HLG	126	120	ORS	MS	LS	LN
Sample Date			7/1	7/1	7/1	7/1	7/1	7/1	7/1	7/1	7/1	7/1	7/1	7/1	7/1
pH, Field	s.u.	EPA 150.1	7.15	7.10	7.15	7.17	7.35	7.27	7.37	7.26	7.43	7.48	7.40	7.50	7.43
Temp, Field	°C	EPA 170.1	17.3	14.1	15	25.7	16.6	13.4	17.9	12.8	14.6	16.7	17.3	16.6	19.5
Alkalinity ($CaCO_3$)	mg/L	SM 2320 B (1997)	310	330	330	330	270	270	270	260	260	260	340	260	270
Aluminum	mg/L	EPA 200.7, Rev 4.4	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Calcium	mg/L	EPA 200.7, Rev 4.4	79	91	100	100	71	63	69	66	54	56	94	58	60
Chloride	mg/L	EPA 300.0, Rev 2.1	50	100	160	160	63	3.3	47	29	2.5	3.1	120	4.5	11
Chlorine, Total	mg/L	DPD Hach	0.35	0.44	0.40	0.20	0.32	0.38	0.29	0.41	0.39	0.35	0.26	0.20	0.37
Chlorine, Free	mg/L	DPD Hach	0.34	0.41	0.37	0.19	0.31	0.35	0.30	0.41	0.38	0.34	0.22	0.17	0.34
Conductivity	µmhos / cm	SM 2510 B (1997)	796	976	1199	1192	750	539	701	642	497	509	1031	525	562
Hardness ($CaCO_3$)	mg/L	EPA 200.7, Rev 4.4	380	430	490	490	350	300	330	320	280	280	450	290	300
Iron	mg/L	EPA 200.7, Rev 4.4	0.054	0.024	0.016	0.064	0.025	0.150	0.014	0.048	0.0085	0.0071	0.031	0.011	0.077
Manganese	µg/L	EPA 200.7, Rev 4.4	9.4	<2.0	<2.0	<2.0	<2.0	16.0	<2.0	5.0	<2.0	<2.0	<2.0	<2.0	6.1
Sulfate	mg/L	EPA 300.0, Rev 2.1	35	26	23	22	14	21	12	13	7.0	7.5	25	6.9	19
Turbidity	NTU	EPA 180.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

MADISON WATER UTILITY

WATER QUALITY PARAMETERS - DISTRIBUTION

EAST	**MB**	**213**	**LBS**	**TRUAX**	**ESD**	**315**	**229**	**225**	**FS5**	**GS**	**IEM**	**PARAMETER**
7/21	7/21	7/21	7/21	7/21	7/21	7/21	7/21	7/21	7/21	7/21	7/14	*Sample Date*
7.29	7.30	7.44	7.32	7.32	7.32	7.56	7.45	7.57	7.44	7.48	7.36	pH, Field
19.1	19.8	18.8	18.9	20.1	14.7	20.9	14.7	21.3	18.5	20.5	16.2	Temp, Field
370	350	350	350	370	360	360	370	380	370	380	160	Alkalinity ($CaCO_3$)
<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	Aluminum
75	78	78	78	78	74	73	73	60	81	84	63	Calcium
21	31	38	45	43	21	20	18	4.5	51	64	3.3	Chloride
0.40	0.22	0.35	0.28	0.30	0.54	0.11	0.37	0.28	0.29	0.34	0.56	Chlorine, Total
0.32	0.25	0.32	0.20	0.37	0.47	0.09	0.33	0.31	0.26	0.38	0.53	Chlorine, Free
707	750	774	796	787	681	670	667	595	823	875	670	Conductivity
380	380	380	390	380	360	360	350	330	400	420	350	Hardness ($CaCO_3$)
0.028	<0.0070	<0.0070	<0.0070	0.017	<0.0070	0.014	<0.0070	0.035	<0.0070	<0.0070	<0.0070	Iron
3.1	<2.0	<2.0	<2.0	<2.0	<2.0	2.4	<2.0	2.9	<2.0	<2.0	<2.0	Manganese
31	27	23	18	18	15	19	14	6.9	22	20	8.7	Sulfate
<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Turbidity

MADISON WATER UTILITY

2020 PFAS Test Results

PFAS Compound	***Source***	**Well 06**	**Well 06**	**Well 06**	**Well 06**	**Well 07**	**Well 07**	**Well 08**	**Well 08**	**Well 09**	**Well 09**	**Well 09**	**Well 09**	**Well 09**	**Well 11**	**Well 11**	**Well 11**	**Well 11**	**Well 12**
	Sample Date	26-May	26-May	26-May	26-May	5-May	5-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	5-May
	Laboratory	TA	WSLH	WSLH	WSLH	TA	WSLH	TA	WSLH	TA	TA	WSLH	WSLH	WSLH	TA	WSLH	WSLH	WSLH	TA
	Lab Method	Mod 537	ISO	537.1	537.1	Mod 537	ISO	Mod 537	537.1	Mod 537	537.1	537.1	537.1	ISO	Mod 537	ISO	537.1	537.1	Mod 537
Perfluorooctanoic acid	**PFOA**	**0.82^{J}**	<0.356	<0.820	<0.837	**1.0^{J}**	**0.347^{J}**	**1.1^{J}**	**0.990**	**1.2^{J}**	**0.54^{J}**	<0.861	<0.887	<0.359	**1.0^{J}**	<0.359	<0.850	<0.838	<0.75
Perfluorooctanesulfonic acid	**PFOS**	**0.47^{J}**	<0.356	<0.543	<0.554	<0.47	**0.123^{J}**	**1.5^{J}**	**0.903**	**0.68^{J}**	**0.65^{J}**	<0.570	<0.587	<0.359	**0.75^{JI}**	<0.359	<0.562	<0.555	<0.47
Perfluorobutanoic acid	**PFBA**	**1.4^{J}**	<3.56	n/a	n/a	**0.60^{JB}**	<1.80	**1.1^{J}**	n/a	**37**	n/a	n/a	n/a	**27.6**	**4.1**	**3.74**	n/a	n/a	**0.65^{JB}**
Perfluoropentanoic acid	**PFPeA**	**0.77^{J}**	<0.356	n/a	n/a	<0.42	<0.180	**0.67^{J}**	n/a	**1.0^{J}**	n/a	n/a	n/a	**0.650**	**0.73^{J}**	**0.401**	n/a	n/a	<0.43
Perfluorohexanoic acid	**PFHxA**	**0.93^{J}**	**0.607**	**0.708**	**0.646**	<0.50	<0.126	**0.75^{J}**	<0.624	**0.82^{J}**	**0.79^{J}**	<0.629	<0.647	**0.485**	**0.53^{J}**	<0.359	<0.620	<0.612	<0.51
Perfluoroheptanoic acid	**PFHpA**	**0.29^{J}**	<0.356	<0.419	<0.428	<0.22	<0.121	**0.31^{J}**	<0.437	**0.35^{J}**	<0.50	<0.440	<0.453	<0.359	**0.26^{J}**	<0.359	<0.434	<0.428	<0.22
Perfluorooctanesulfonamide	**FOSA**	**1.6^{JB}**	<0.356	n/a	n/a	**2.4^{B}**	**0.470^{B}**	**2.0^{B}**	n/a	**3.1^{B}**	n/a	n/a	n/a	<0.359	**1.2^{JB}**	<0.359	n/a	n/a	**1.5^{JB}**
Perfluorododecanoic acid	**PFDoA**	**0.56^{J}**	<0.356	<0.915	<0.934	<0.48	<0.0936	<0.47	<0.953	<0.48	<0.50	<0.961	<0.989	<0.359	<0.46	<0.359	<0.948	<0.935	<0.48
Perfluorotetradecanoic acid	**PFTeDA**	**0.52^{J}**	<0.356	<0.681	<0.695	<0.25	<0.261	<0.25	<0.709	<0.25	<0.50	<0.715	<0.736	<0.359	<0.24	<0.359	<0.705	<0.695	<0.25
Perfluorobutanesulfonic acid	**PFBS**	**1.1^{J}**	**0.749**	**0.855**	**0.796**	<0.17	<0.214	<0.17	<0.402	**0.92^{J}**	**0.89^{J}**	**0.654**	**0.680**	**0.668**	**0.48^{J}**	**0.389**	<0.400	<0.394	<0.18
Perfluoropentane sulfonic acid	**PFPeS**	**0.74^{J}**	**0.555**	n/a	n/a	<0.26	<0.0504	<0.25	n/a	**0.26^{J}**	n/a	n/a	n/a	<0.359	<0.25	<0.359	n/a	n/a	<0.26
Perfluorohexanesulfonic acid	**PFHxS**	**4.2^{B}**	**3.37**	**3.76**	**3.66**	**0.75^{JB}**	**0.545**	**0.93^{JB}**	**0.618**	**1.4^{JB}**	**1.8^{J}**	**1.13**	**1.20**	**1.09**	**1.7^{B}**	**1.31**	**1.29**	**1.26**	<0.15
N-Methyl perfluorooctane sulfonamidoethanol	**NMeFOSE**	<1.2	<0.356	n/a	n/a	<1.2	<0.180	<1.2	n/a	<1.2	n/a	n/a	n/a	<0.359	<1.2	<0.359	n/a	n/a	**9.0**
N-Ethyl perfluorooctane sulfonamidoethanol	**NEtFOSE**	<0.71	<0.356	n/a	n/a	<0.74	<0.115	<0.72	n/a	<0.74	n/a	n/a	n/a	<0.359	<0.71	<0.359	n/a	n/a	**1.5^{J}**
6:2 Fluorotelomer sulfonic acid	**6:2 FTS**	<1.7	<0.356	n/a	n/a	<1.7	<0.0738	<1.7	n/a	<1.7	n/a	n/a	n/a	<0.359	<1.7	<0.359	n/a	n/a	<1.8
PFOA+PFOS*		1.3	ND	ND	ND	1.0	0.5	2.6	1.9	1.9	1.2	ND	ND	ND	1.8	ND	ND	ND	ND
Combined PFAS*		**13**	**5.3**	**5.3**	**5.1**	**4.8**	**1.5**	**8.4**	**2.5**	**47**	**4.7**	**1.8**	**1.9**	**30**	**11**	**5.8**	**1.3**	**1.3**	**13**

NOTES:

All results in ng/L or parts per trillion (ppt)

Faded results with < indicate result was below detection limit

Results with J indicate an estimated value due to being below reporting limit

Results with B indicate the PFAS was also detected in the laboratory method blank

Varying results and levels of detection are due to differences

* - this is an estimate derived from the sum of estimated valu

MADISON WATER UTILITY

2020 PFAS Test Results

Well 13	Well 14	Well 14	Well 14	Well 14	Well 14	Well 16	Well 16	Well 17	Well 17	Well 18	Well 19	Well 20	Well 24	Well 25	Well 26	Well 27	Well 28	Well 29	Well 29	Well 30	Well 31	
26-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	26-May	5-May	5-May	5-May	5-May	5-May	26-May	26-May	5-May	5-May	5-May	5-May	5-May	
TA	TA	TA	WSLH	WSLH	WSLH	TA	WSLH	TA	WSLH	TA	TA	TA	TA	TA	TA	TA	TA	TA	WSLH	TA	TA	
Mod 537	Mod 537	537.1	537.1	537.1	ISO	Mod 537	537.1	Mod 537	537.1	Mod 537	Mod 537	Mod 537	Mod 537	Mod 537	Mod 537	Mod 537	Mod 537	Mod 537	ISO	Mod 537	Mod 537	**PFAS**
1.4^{J}	**1.8**	**1.4^{J}**	**1.04**	**1.32**	**0.699**	**1.6^{J}**	<0.868	**1.0^{J}**	<0.872	**0.80^{J}**	<0.78	<0.73	<0.77	**0.82^{J}**	**0.79^{J}**	**1.2^{J}**	<0.76	**0.78^{J}**	<0.0973	**0.80^{J}**	<0.73	**PFOA**
0.54^{J}	**0.76^{J}**	**0.99^{J}**	<0.571	<0.569	<0.367	**1.8**	**1.20**	**0.71^{J}**	<0.577	**0.53^{J}**	<0.50	<0.47	**0.52^{J}**	**0.62^{J}**	**0.99^{J}**	**0.55^{J}**	<0.48	<0.48	**0.150^{J}**	**0.51^{J}**	<0.46	**PFOS**
1.8	**3.9**	n/a	n/a	n/a	**4.03**	**1.6^{J}**	n/a	**0.85^{J}**	n/a	**1.0^{JB}**	**0.70^{JB}**	**0.48^{JB}**	**0.64^{JB}**	**0.45^{JB}**	**0.90^{J}**	**1.2^{J}**	**0.71^{JB}**	**1.2^{JB}**	<1.84	**0.61^{JB}**	**0.41^{JB}**	**PFBA**
1.6^{J}	**2.0**	n/a	n/a	n/a	**1.49**	**1.2^{J}**	n/a	<0.42	n/a	**0.49^{J}**	<0.45	<0.42	<0.44	<0.41	**0.42^{J}**	**0.93^{J}**	<0.44	<0.44	<0.184	<0.41	<0.42	**PFPeA**
1.9	**2.2**	**2.1**	**1.76**	**1.57**	**1.58**	**1.1^{J}**	**0.827**	<0.50	<0.636	<0.49	<0.53	<0.50	<0.52	<0.49	<0.48	**0.87^{J}**	<0.52	<0.52	<0.128	<0.49	<0.50	**PFHxA**
0.52^{J}	**0.70^{J}**	**0.78^{J}**	**0.502**	**0.513**	**0.468**	**0.50^{J}**	<0.444	<0.22	<0.446	<0.21	<0.23	<0.22	<0.23	<0.21	<0.21	**0.30^{J}**	<0.22	<0.22	<0.124	<0.21	<0.21	**PFHpA**
2.4^{B}	**2.0^{B}**	n/a	n/a	n/a	<0.367	**1.7^{B}**	n/a	**2.5^{B}**	n/a	**2.6^{B}**	**2.1^{B}**	**1.8^{B}**	**2.9^{B}**	**3.2^{B}**	**1.8^{B}**	**2.2^{B}**	**2.6^{B}**	**3.6^{B}**	**0.261^{JB}**	**3.7^{B}**	**4.4^{B}**	**FOSA**
<0.48	<0.49	<0.50	<0.962	<0.960	<0.367	<0.48	<0.968	<0.48	<0.973	<0.47	<0.51	<0.47	<0.50	<0.46	<0.45	<0.48	<0.49	<0.49	<0.0954	<0.46	<0.47	**PFDoA**
<0.25	<0.26	<0.50	<0.716	<0.714	<0.367	<0.25	<0.720	<0.25	<0.723	<0.25	<0.27	<0.25	<0.26	**0.29^{J}**	<0.24	<0.25	<0.26	<0.26	<0.266	<0.24	<0.25	**PFTeDA**
1.1^{J}	**1.7^{J}**	**1.7^{J}**	**1.28**	**1.22**	**1.30**	**0.85^{J}**	**0.624**	<0.17	<0.410	<0.17	<0.18	<0.17	<0.18	<0.17	**0.25^{J}**	**0.62^{J}**	<0.18	<0.18	<0.218	<0.17	<0.17	**PFBS**
<0.26	**0.41^{J}**	n/a	n/a	n/a	<0.367	<0.26	n/a	<0.26	n/a	<0.26	<0.28	<0.26	<0.27	<0.25	<0.25	<0.26	<0.27	<0.27	<0.0514	<0.25	<0.26	**PFPeS**
2.6^{B}	**5.0^{B}**	**6.4**	**4.15**	**4.08**	**4.15**	**2.9^{B}**	**2.40**	**0.77^{JB}**	**0.597**	**0.46^{JB}**	**0.30^{JB}**	**0.25^{JB}**	**0.28^{JB}**	<0.14	**0.92^{JB}**	**1.8^{B}**	**0.26^{JB}**	**0.43^{JB}**	**0.131^{J}**	**0.30^{JB}**	**0.26^{JB}**	**PFHxS**
<1.2	<1.2	n/a	n/a	n/a	<0.367	<1.2	n/a	<1.2	n/a	<1.2	<1.3	<1.2	<1.3	<1.2	<1.2	<1.2	<1.3	<1.3	<0.184	<1.2	<1.2	**NMeFOSE**
<0.74	<0.75	n/a	n/a	n/a	<0.367	<0.74	n/a	<0.74	n/a	<0.72	<0.78	<0.73	<0.77	<0.71	<0.70	<0.74	<0.76	<0.76	<0.117	<0.72	<0.73	**NEtFOSE**
<1.7	<1.8	n/a	n/a	n/a	<0.367	<1.7	n/a	<1.7	n/a	<1.7	<1.8	<1.7	<1.8	<1.7	<1.6	<1.7	<1.8	<1.8	<0.0752	<1.7	**3.0^{J}**	**6:2 FTS**
1.9	2.6	2.4	1.0	1.3	0.7	3.4	1.2	1.7	ND	1.3	ND	ND	0.5	1.4	1.8	1.8	ND	0.8	0.2	1.3	ND	
14	**20**	**13**	**8.7**	**8.7**	**14**	**13**	**5.1**	**5.8**	**0.6**	**5.9**	**3.1**	**2.5**	**4.3**	**5.4**	**6.1**	**9.7**	**3.6**	**6.0**	**0.5**	**5.9**	**8.1**	

in analytical methods and lab capabilities

es

n/a - not analyzed

ND - none detected

Lab: TA = TestAmerica

Lab: WSLH = WI State Laboratory of Hygiene

Method: 537.1 - EPA Standard Method

Method: Mod 537 - Modified EPA Method 537

Method: ISO - Modified ISO 21675

Annual Inorganics Analysis - 2020

PARAMETER	UNITS	MCL	Well 6	Well 7	Well 8	Well 9	Well 11	Well 12	Well 13	Well 14	Well 16	Well 17	Well 18	Well 19	Well 20	Well 24	Well 25	Well 26	Well 27	Well 28	Well 29	Well 30	Well 31	PARAMETER
	Sample Date		7/8/2020	7/7/2020	7/7/2020	7/7/2020	7/7/2020	7/8/2020	7/7/2020	7/8/2020	7/8/2020	7/7/2020	7/8/2020	7/8/2020	7/8/2020	7/7/2020	7/7/2020	7/8/2020	7/8/2020	7/8/2020	7/7/2020	7/8/2020	7/7/2020	*Sample Date*
Alkalinity (CaCO3)	mg/l	--	310	310	300	320	310	260	310	330	270	250	260	270	260	250	290	270	300	270	310	260	330	**Alkalinity ($CaCO_3$)**
Aluminum	mg/l	SMCL: 0.05	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	**Aluminum**
Antimony	µg/l	6	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	**Antimony**
Arsenic	µg/l	10	0.17	<0.14	0.52	0.18	0.21	<0.14	0.17	0.21	<0.14	0.21	<0.14	0.24	<0.14	0.27	<0.14	0.17	0.23	0.24	<0.14	0.44	<0.14	**Arsenic**
Barium	µg/l	2000	26	35	33	37	19	15	34	64	21	21	16	17	9.9	13	7.2	20	27	15	48	17	20	**Barium**
Beryllium	µg/l	4	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	**Beryllium**
Cadmium	µg/l	5	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	**Cadmium**
Calcium	mg/l	--	88	76	68	87	83	61	77	100	73	65	64	64	55	56	59	68	79	63	71	59	62	**Calcium**
Chloride	mg/l	SMCL: 250	76	20	23	73	66	4.2	43	160	78	40	15	9.3	2.3	6.0	3.3	38	43	3.3	7.3	7.6	1.5	**Chloride**
Chromium, Total	µg/l	100	1.5	<0.58	<0.58	1.1	0.90	<0.58	1.5	2.2	0.72	<0.58	<0.58	<0.58	0.89	<0.58	0.68	<0.58	<0.58	<0.58	<0.58	<0.58	<0.58	**Chromium, Total**
Chromium, Hexavalent	µg/l	--	1.8[C]	n/s	n/s	n/s	n/s	n/s	1.3[C]	2.0[C]	1.2[C]	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	0.03[C]	**Chromium, Hexavalent**
Conductivity	umhos/cm	--	939	705	653	911	889	550	769	1265	843	702	611	573	526	537	586	705	805	563	614	564	631	**Conductivity**
Copper	µg/l	1300	9.8	2.7	5.6	17	1.4	2.6	3.4	9.1	6.9	3.2	1.8	9.8	2.7	1.7	7.2	2.1	3.1	0.99	2.9	2.1	32	**Copper**
Fluoride	mg/l	4	0.76[A]	0.69	0.76	0.75	0.76	0.81[A]	0.84	0.71[A]	0.78[A]	0.69	0.78[A]	0.75[A]	0.76[A]	1.2	0.85	0.79[A]	0.84[B]	0.79[A]	0.70	0.56[B]	0.81	**Fluoride**
Hardness ($CaCO_3$)	mg/l	--	420	370	340	420	420	300	380	490	360	340	320	300	280	280	330	330	380	300	340	300	350	**Hardness ($CaCO_3$)**
Iron	mg/l	SMCL: 0.3	0.0080	0.011	0.46	0.012	0.025	0.013	0.037	0.0083	0.0074	0.11	0.022	0.200	0.019	0.20	0.055	0.011	0.16	0.16	0.016	0.19	0.012	**Iron**
Lead	µg/l	15	<0.030	<0.030	0.15	0.14	0.12	<0.030	0.19	0.038	0.031	0.067	0.078	0.40	0.093	0.049	0.11	0.10	<0.030	0.14	0.045	<0.030	<0.030	**Lead**
Magnesium	mg/l	--	46	41	38	41	47	34	41	54	41	37	37	34	34	30	37	38	41	34	33	34	41	**Magnesium**
Manganese	µg/l	SMCL: 50	<2.0	<2.0	48	<2.0	7.3	2.4	2.1	<2.0	<2.0	30	3.7	43.0	<2.0	25	3.5	<2.0	32	22	<2.0	13	<2.0	**Manganese**
Mercury	ug/l	2	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	**Mercury**
Nickel	µg/l	100	1.6	0.72	0.74	0.84	0.93	0.72	0.59	0.70	0.63	0.66	<0.50	0.89	<0.50	<0.50	<0.50	0.97	2.2	0.98	0.70	<0.50	<0.50	**Nickel**
Nitrogen - Nitrate	mg/l	10	2.7[A]	0.035	<0.029	2.6	2.7	1.0[A]	3.8	3.7[A]	2.4[A]	<0.029	0.71[A]	<0.036[A]	0.62[A]	0.058	0.97	2.6[A]	0.36[B]	<0.036[A]	1.7	<0.036[B]	<0.029	**Nitrogen - Nitrate**
Nitrogen - Nitrite	mg/l	1	<0.036[A]	<0.036	<0.036	<0.036	<0.036	<0.036[A]	<0.036	<0.036[A]	<0.036[A]	<0.036	<0.036[A]	<0.036[A]	<0.036[A]	<0.036	<0.036	<0.036[A]	<0.036[B]	<0.036[A]	<0.036	<0.036[B]	<0.036	**Nitrogen - Nitrite**
pH (Lab)	s.u.	--	6.86	7.21	7.28	7.10	7.19	7.05	7.21	6.96	7.10	7.26	7.14	7.11	7.16	7.37	7.34	7.06	7.04	7.03	7.29	7.20	7.39	**pH (Lab)**
Selenium	µg/l	50	0.98	<0.47	<0.47	1.0	0.58	<0.47	0.88	1.0	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	0.62	<0.47	<0.47	<0.47	0.57	<0.47	<0.47	**Selenium**
Silver	µg/l	SMCL: 100	<0.090	0.092	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090	**Silver**
Sodium	mg/l	--	29	8.0	10	28	25	2.5	19	60	31	17	6.1	4.4	2.2	4.8	3.1	17	20	2.4	3.8	4.0	3.3	**Sodium**
Strontium	µg/l	--	82	100	76	85	94	60	83	95	68	87	91	96	55	73	66	61	96	52	79	110	78	**Strontium**
Sulfate	mg/l	SMCL: 250	26	33	16	22	25	9.2	17	23	13	37	17	7.7	6.9	13	6.1	13	38	21	10	19	7.9	**Sulfate**
Thallium	µg/l	2	<0.11	<0.11	<0.11	<0.11	0.14	<0.11	<0.11	<0.11	<0.11	0.11	<0.11	0.12	<0.11	<0.11	<0.11	<0.11	0.17	<0.11	<0.11	<0.11	<0.11	**Thallium**
Total Solids	mg/l	SMCL: 500	550	390	320	460	500	270	410	640	430	360	300	290	260	280	280	350	450	270	310	380	320	**Total Solids**
Zinc	µg/l	SMCL: 5000	<3.8	<3.8	7.8	<3.8	<3.8	9.7	<3.8	<3.8	8.8	13	<3.8	<3.8	<3.8	4.1	<3.8	11	4.9	7.1	<3.8	<3.8	<3.8	**Zinc**

MCL - Maximum Contaminant Level   SMCL - Secondary MCL   A - Sampled on July 22   B - Sampled on July 29   C - Sampled June 3   n/s - not sampled

MADISON WATER UTILITY

2020 VOLATILE ORGANIC COMPOUND (VOC) RESULTS

Volatile Organic Compounds	Units	MCL	MCLG	6	6	6	6	7	7	7	7	8	8	9	9	9	9	11	11	11	11	12	13	14	14	14	14	16	17	18	18	18	18	19	20	24	25	26	27	28	29	30	31	Volatile Organic Compounds
	Sample Date			1/22	4/22	7/15	10/12	1/21	4/21	7/14	10/12	4/21	10/12	1/21	4/21	7/14	10/12	1/21	4/21	7/14	10/12	1/22	4/21	1/22	4/22	7/15	10/12	1/22	7/14	1/22	4/22	7/15	10/12	1/22	1/22	4/21	4/21	1/22	7/15	1/22	4/21	4/22	4/22	
Benzene	ppb	5	zero	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	Benzene
Bromobenzene	ppb	--	--	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	Bromobenzene
Bromodichloromethane*	ppb	80	zero	<0.42	<0.42	<0.42	<0.42	**1.1**	**1.1**	**0.92**	**1.5**	**0.48**	**1.3**	<0.42	**1.0**	**1.3**	**0.94**	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	**0.79**	<0.42	<0.42	<0.42	<0.42	**2.5**	<0.42	**1.7**	<0.42	<0.42	<0.42	<0.42	**0.50**	<0.42	<0.42	**Bromodichloromethane***
Bromoform*	ppb	80	zero	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	**0.96**	**0.99**	**0.46**	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	**Bromoform***
Bromomethane	ppb	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Bromomethane
Carbon Tetrachloride	ppb	5	zero	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	Carbon Tetrachloride
Chloroethane	ppb	--	--	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	Chloroethane
Chloroform*	ppb	80	--	<0.52	<0.52	<0.52	<0.52	**0.85**	**0.83**	**0.70**	**1.3**	**0.62**	**1.6**	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	**0.63**	<0.52	<0.52	<0.52	<0.52	**3.4**	<0.52	**1.2**	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52	**Chloroform***
Chloromethane	ppb	--	--	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	Chloromethane
o-Chlorotoluene	ppb	--	--	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	o-Chlorotoluene
p-Chlorotoluene	ppb	--	--	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	p-Chlorotoluene
Dibromochloromethane*	ppb	80	60	<0.41	<0.41	<0.41	**0.45**	**0.94**	**1.2**	**0.73**	**1.3**	<0.41	**0.88**	<0.41	**1.7**	**2.1**	**1.2**	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	**0.65**	<0.41	<0.41	<0.41	**0.66**	**1.2**	<0.41	**1.8**	<0.41	<0.41	<0.41	<0.41	**0.42**	<0.41	<0.41	**Dibromochloromethane***
Dibromomethane	ppb	--	--	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	Dibromomethane
m-Dichlorobenzene (1,3)	ppb	--	--	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	m-Dichlorobenzene (1,3)
o-Dichlorobenzene (1,2)	ppb	600	600	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	o-Dichlorobenzene (1,2)
p-Dichlorobenzene (1,4)	ppb	75	75	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	p-Dichlorobenzene (1,4)
Dichlorodifluoromethane	ppb	--	--	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	Dichlorodifluoromethane
1,1-Dichloroethane	ppb	--	--	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	1,1-Dichloroethane
1,2-Dichloroethane	ppb	5	zero	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	1,2-Dichloroethane
1,1-Dichloroethylene	ppb	7	7	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	1,1-Dichloroethylene
1,2-Dichloroethylene (cis)	ppb	70	70	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	**0.39**	**0.41**	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	**1,2-Dichloroethylene (cis)**
1,2-Dichloroethylene (trans)	ppb	100	100	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	1,2-Dichloroethylene (trans)
Dichloromethane	ppb	5	zero	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Dichloromethane
1,2-Dichloropropane	ppb	5	zero	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	1,2-Dichloropropane
1,3-Dichloropropane	ppb	--	--	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	1,3-Dichloropropane
2,2-Dichloropropane	ppb	--	--	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	<0.87	2,2-Dichloropropane
1,1-Dichloropropene	ppb	--	--	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	1,1-Dichloropropene
1,3-Dichloropropene	ppb	--	--	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	1,3-Dichloropropene
Ethylbenzene	ppb	700	700	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	**0.55**	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	**Ethylbenzene**
Hexachlorobutadiene	ppb	--	--	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	Hexachlorobutadiene
Isopropylbenzene	ppb	--	--	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	Isopropylbenzene
p-Isopropyltoluene	ppb	--	--	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	p-Isopropyltoluene
Methyl t-butyl ether	ppb	--	--	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	Methyl t-butyl ether
Monochlorobenzene	ppb	100	100	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	Monochlorobenzene
Naphthalene	ppb	--	--	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	Naphthalene
Styrene	ppb	100	100	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	Styrene
1,1,1,2-Tetrachloroethane	ppb	--	--	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane	ppb	--	--	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	1,1,2,2-Tetrachloroethane
Tetrachloroethylene	ppb	5	zero	**1.2**	**1.3**	**0.98**	**1.2**	**0.65**	**0.80**	**0.68**	**0.89**	<0.27	<0.27	**1.9**	**1.9**	**1.5**	**1.8**	**0.62**	**0.67**	**0.55**	**0.69**	<0.27	<0.27	**0.31**	**0.43**	**0.29**	**0.33**	<0.27	<0.27	**1.7**	**2.0**	**2.0**	**2.1**	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	**Tetrachloroethylene**
Toluene	ppb	1000	1000	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	Toluene
1,2,4-Trichlorobenzene	ppb	70	70	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	1,2,4-Trichlorobenzene
1,1,1-Trichloroethane	ppb	200	200	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	1,1,1-Trichloroethane
1,1,2-Trichloroethane	ppb	5	3	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	1,1,2-Trichloroethane
Trichloroethylene	ppb	5	zero	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	<0.46	Trichloroethylene
Trichlorofluoromethane	ppb	--	--	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	**0.59**	**0.54**	**0.47**	**0.71**	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	**Trichlorofluoromethane**
1,2,3-Trichloropropane	ppb	--	--	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	1,2,3-Trichloropropane
Trichlortrifluoroethane	ppb	--	--	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	Trichlortrifluoroethane
1,2,4-Trimethylbenzene	ppb	--	--	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene	ppb	--	--	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	1,3,5-Trimethylbenzene
Vinyl Chloride	ppb	0.2	zero	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	Vinyl Chloride
Xylene, Total	ppb	10000	10000	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	**1.1**	**3.6**	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	<0.88	**Xylene, Total**