

Internal Monitoring Report

Policy #: O-2B Water Quality

Date: October 26, 2021

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.

A. Contaminants with a primary MCL, Action Level or Enforcement Standard

Coliform Bacteria - Between April and September 1,426 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. In addition, fifty-one untreated (non-chlorinated) well samples were collected during this reporting period. All except for one were found to be free of coliform bacteria. A sample collected following well repairs at Well 16 tested positive; however, three subsequent samples from that well all were 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 - beryllium, cadmium, mercury, or silver. Except for

barium and nitrate, detections of other contaminants were at low levels, often just above the level of detection. Arsenic was found at four wells and antimony at one. Total chromium measured at levels similar to those found in previous years. Unlike previous years, nitrite was detected at nearly all wells in the 0.2 to 0.3 mg/L range. **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 2021 results do not deviate significantly from results in previous years.

Table 1. Summary of Regulated Inorganic Chemical Detections (2021)

Parameter	MCL	Units	Detections	Minimum	Median	Maximum
Antimony	6	µg/L	1	<0.1	<0.1	0.11
Arsenic	10	µg/L	4	<0.2	<0.2	0.51
Barium	2000	µg/L	21	7.3	22	66
Beryllium	4	µg/L	0	<0.1	<0.1	<0.1
Cadmium	5	µg/L	0	<0.1	<0.1	<0.1
Chromium	100	µg/L	16	<0.1	0.53	2.1
Mercury	2	µg/L	0	<0.01	<0.01	<0.01
Nickel	100	µg/L	21	0.55	1.0	2.5
Nitrate	10	mg/L	15	<0.06	0.75	4.0
Nitrite	1	mg/L	20	<0.04	0.22	0.30
Selenium	50	µg/L	8	<0.5	<0.5	1.4
Thallium	2	µg/L	5	<0.1	<0.1	0.19

Volatile Organic Compounds – Twenty samples from fourteen wells were tested between April and September 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 detected at these six wells with levels ranging from 0.28 to 3.7 µg/L. The maximum contaminant level (MCL) for PCE is 5 µg/L. PCE levels are mostly stable at all six wells; however, small but steady increases have been observed at Wells 6, 7 and 18 in recent months or years. A detection summary is found in **Table 2**.

Except for a small amount of xylene detected at Well 24 and disinfection by-products at other wells, no VOC was found at the other eight wells tested – Wells 8, 13, 17, 24, 25, 27, 29, and 30. Complete test results are included as an attachment.

Table 2. Summary of VOC Detections - April to September 2021

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	0.37	<0.35	<0.35
Tetrachloroethylene (PCE)	5	1.4	1.1	1.7	0.73	0.36	3.7
Trichlorofluoromethane	--	<0.29	<0.29	<0.29	0.78	<0.29	<0.29

Radium – Radium monitoring follows the guidance provided in GUIDE 8. Currently, five wells are tested annually and two (Wells 19 & 27) are tested quarterly. Each of these seven wells has radium that is consistently above 2.5 pCi/L; the MCL is 5 pCi/L. **Table 3** below summarizes radium results for samples collected year to date. Well 28 will be sampled in November.

The utility’s Capital Improvement Plan includes installation of filtration equipment to remove iron and manganese from Well 19. Construction is planned to begin in 2023. The selected treatment is also expected to reduce the radium level.

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

	Number of Samples	Results	Annual Average of Quarterly Samples
Well 7	1	3.0	n/a
Well 8	1	2.5	n/a
Well 19	6*	3.6 – 5.3	4.1
Well 24	1	3.4	n/a
Well 27	6*	3.2 – 4.7	4.1
Well 30	1	2.9	n/a

* Includes duplicate samples

B. Contaminants with a secondary MCL

Iron and Manganese - Monthly well samples are collected when iron and manganese are elevated. During the period from April to September, all four samples from Well 8 exceeded the secondary MCL for iron [0.3 mg/L] and for manganese [50 µg/L]. All remaining wells met the SMCL for both metals during each month of testing. Results are shown in **Tables 4 and 5**.

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

Source	Apr	May	Jun	Jul	Aug	Sep
Well 7 – filtered	<0.01	0.03	0.01	<0.01	0.01	<0.01
Well 8	n/s	n/s	0.58	0.61	0.62	0.60
Well 17	n/s	n/s	0.12	0.12	0.12	0.13
Well 19	0.22	0.23	0.22	0.23	0.23	0.23
Well 24	n/s	0.22	0.22	0.21	0.22	0.22
Well 26 – deep well	<0.01	<0.01	<0.01	0.01	0.04	0.01
Well 27	0.20	0.17	0.17	0.16	0.17	0.17
Well 28	0.19	0.19	0.19	0.19	0.19	0.19
Well 29 – filtered	<0.01	<0.01	0.01	<0.01	0.01	<0.01
Well 30	0.20	0.20	0.19	0.20	0.20	0.19
Well 31 – filtered	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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

Source	Apr	May	Jun	Jul	Aug	Sep
Well 7 – filtered	0.4	1.3	0.6	<0.2	0.5	<0.2
Well 8	n/s	n/s	52	51	52	51
Well 17	n/s	n/s	37	29	32	32
Well 19	47	48	44	44	46	48
Well 24	n/s	29	27	26	28	27
Well 26 – deep well	3.7	2.3	20	6.5	5.9	13
Well 27	33	29	33	26	30	29
Well 28	22	23	23	21	22	21
Well 29 – filtered	0.3	0.3	1.8	0.3	2.4	0.4
Well 30	14	14	14	14	14	14
Well 31 – filtered	<0.2	0.2	0.2	0.2	<0.2	<0.2

Filters at Well 7, Well 29, and Well 31 continue to show significant iron and manganese reductions. Test results are shown in **Tables 4 and 5**. Reductions regularly exceed 98%. In all cases, iron was reduced to less than 0.03 mg/L and in many cases to below 0.01 mg/L. Manganese was regularly lowered to below 1.0 µg/L.

While each well except for Well 8 met the secondary MCL, 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, excluding Well 30, also exceed the Board Policy level for manganese [20 µg/L], a level above which treatment is required. The installation of a filter at Well 19 is planned for 2023, while plans for treatment at some of the other wells appear in the latter years of the Capital Improvement Plan.

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			Iron, mg/L		
	Apr - Sep	2021		Apr - Sep	2021
Policy Goal	50	50	Policy Goal	0.3	0.3
Median	1.6	1.5	Median	<0.01	<0.01
Average	3.1	3.2	Average	0.02	0.02
95th Percentile	14	16	95th Percentile	0.10	0.14
Maximum	19	19	Maximum	0.18	0.20
Number of Samples	56	83	Number of Samples	56	83
>50	0	0	>0.3	0	0

Chloride – Twice monthly chloride monitoring continues at Well 14. A dozen samples were collected between April and September with chloride ranging from 162 to 173 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. For example, both Wells 6 & 16 have experienced a 66% increase since 2015, and are approaching 100 mg/L.

A preliminary review of data from shallow groundwater in Spring Harbor Park and the stormwater discharge into Lake Mendota at Spring Harbor suggest a strong influence of that stormwater drainage on Well 14 water quality. Further groundwater study is planned for winter 2021-2022.

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.

C. Unregulated and Emerging Contaminants

Per and Polyfluoroalkyl Substances [PFAS] - The Water Utility continues to proactively monitor for PFAS in all Madison wells. Water samples were collected from 21 active wells in September and early October, and will be analyzed for nearly three dozen PFAS. Results are not yet available.

1,4-Dioxane - During the monitoring period, water samples from ten wells (6, 7, 8, 9, 11, 14, 17, 18, 27, and 31) were tested for dioxane. The wells were selected due to previous organic contamination that serves as a potential predictor of additional contaminants, or in the case of Well 31, a new well not previously tested for this chemical. Dioxane was not found at seven of the ten wells tested, measured 0.09 µg/L at Wells 14 & 18, and was highest at Well 11 - 0.31 µg/L. On-going monitoring shows a gradual but steady decrease of dioxane in the wells where it is found. Since 2018, the level of dioxane at Well 11 has ranged from 0.29 - 0.41 µg/L, with an average of 0.33 µg/L.

Chromium-6 - Twenty wells were tested for chromium-6, or hexavalent chromium during the monitoring period. The range of results was <0.02 µg/L to 2.1 µg/L. There is no current regulatory standard for chromium-6; however, the MCL for total chromium is 100 µg/L. Wells with higher

levels of hexavalent chromium (>1.0 µg/L: Wells 6, 13, 14, and 16) are tested annually while all other wells are tested triennially. Full results are included in the Annual Inorganics Results table as an attachment.

Sodium - In accordance with GUIDE 8, monthly sodium testing continues at Well 14. Twelve samples were collected between April and September with results ranging from 59 to 63 mg/L sodium. The average was 61 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. In addition to Well 14, four other wells (6, 9, 11, & 16) now exceed and two others (13 & 27) are approaching this guideline.

D. 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 2021.

E. Water Quality Technical Advisory Committee

The Water Quality Technical Advisory Committee met on October 11 and recommended maintaining the status quo regarding community water fluoridation by a vote of 2 (yes) - 1 (no) - 1 (abstain).

Attachments:

Water Quality Watch List

Water Quality Test Results

Annual Inorganics Analysis - 2021

2021 Volatile Organic Compound (VOC) Results

**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]	3.7	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, #24, #31	none		NR 809.24

* Maximum detection observed at any Madison well from 2017 through 2021

% Detected in at least one sample collected from 2017 through 2021

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	WI DNR Rulemaking
Trichlorofluoromethane	1.1	µg/L	n/a	698	3490	#11	none		NR 140.10
Trichlorotrifluoroethane	0.54	µg/L	--	--	--	#14	none		N.A.

* Maximum detection observed at any Madison well from 2017 through 2021

% Detected in at least one sample collected from 2017 through 2021

~ 10⁻⁶ Cancer Risk Level

^ PFOA + PFOS

Proposed

Radionuclides (2020 & 2021 data)

Contaminant	Maximum	Units	MCLG	Watch	MCL	Wells with Detects	Watch List	Action Plan	Reference
Gross alpha	11	pCi/L	zero	5	15	All Wells	#7, #18, #19, #25, #27, #28	Annual or Quarterly Monitoring	NR 809.50
Gross beta	10	pCi/L	zero	10	50	All Wells	#27		NR 809.50
Combined Radium	5.3	pCi/L	zero	2.5	5	All Wells	#7, #8, #19, #24, #27, #28, #30	Continued Monitoring; Treatment (2023)	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
Antimony	0.11	µg/l	6	1.2	6	#9	none		NR 140.10
Arsenic	0.51	µg/l	zero	1	10	#8, #19, #24, #30	none		NR 809.11
Barium	66	µg/l	2000	400	2000	All Wells	none		NR 809.11
Chromium, Total	2.1	µg/l	100	10	100	#6, #8, #9, #11, #12, #13, #14, #16, #17, #18, #20, #25, #26, #27, #29, #31	none		NR 809.11
Nickel	2.5	µg/l	100	20	100	All Wells	none		NR 809.11
Nitrogen-Nitrate	4.0	mg/l	10	2	10	#7, #9, #12, #18, #20, #25, #26, #27, #28, #29	#6, #11, #13, #14, #16	Annual Monitoring	NR 809.11
Nitrogen-Nitrite	0.30	mg/l	1	0.2	1	All Wells Except #14	none		NR 809.11
Selenium	1.4	µg/l	50	10	50	#6, #9, #11, #13, #14, #16, #25, #29	none		NR 809.11
Thallium	0.19	µg/l	0.5	0.4	2	#11, #12, #17, #19, #27	none		NR 809.11

* Based on 2021 annual test data

Inorganics - Unregulated

Substance	Maximum*	Units	MCLG	Watch	SMCL	Wells with Detects	Watch List	Action Plan	Reference
Chloride	164	mg/l	n/a	125	250	All Wells	#14	GW Investigation, (2021/2022)	NR 809.70
Iron	0.62	mg/l	n/a	0.1	0.3	All Wells Except #20	#8, #17, #19, #24, #27, #28, #30	Install Filtration: Well #8 (2026) Well #19 (2023) Well #24 (20XX) Well #28 (20XX) Well #30 (20XX)	NR 809.70
Manganese	52	µg/l	n/a	20	50	All Wells Except #14	#8, #17, #19, #24, #26, #27, #28		NR 809.70
Sodium	60	mg/l	n/a	20	n/a	All Wells	#6, #9, #11, #14, #16	Annual Monitoring	EPA DWEL
Sulfate	40	mg/l	n/a	125	250	All Wells	none		NR 809.70
Zinc	26	µg/l	n/a	2500	5000	All Wells	none		NR 809.70

* Based on 2021 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)

Annual Inorganics Analysis - 2021

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	6/7/2021	6/8/2021	8/3/2021	6/8/2021	6/8/2021	6/7/2021	6/8/2021	6/7/2021	9/27/2021	8/3/2021	8/3/2021	6/7/2021	6/7/2021	6/8/2021	6/8/2021	6/7/2021	6/7/2021	6/7/2021	6/8/2021	6/7/2021	6/8/2021	Sample Date
Alkalinity (CaCO ₃)	mg/L	--	324	328	311	331	335	281	321	340	293	279	283	288	273	277	316	281	311	282	317	273	342	Alkalinity (CaCO ₃)	
Aluminum	µg/L	SMCL: 50	0.792	0.461	1.47	0.57	0.644	0.936	0.606	0.644	0.931	0.323	0.473	0.946	0.494	0.837	1.03	0.905	0.437	0.654	0.543	0.585	0.53	Aluminum	
Antimony	µg/L	6	< 0.103	< 0.103	< 0.103	0.107	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	Antimony	
Arsenic	µg/L	10	< 0.206	< 0.206	0.505	< 0.206	< 0.206	< 0.206	< 0.206	< 0.206	< 0.206	< 0.206	< 0.206	0.226	< 0.206	0.232	< 0.206	< 0.206	< 0.206	< 0.206	< 0.206	0.207	< 0.206	Arsenic	
Barium	µg/L	2000	28.4	37.4	36.0	31.2	20.8	14.4	36.1	66.4	23.1	22.9	13.3	17.9	10.4	13.5	7.27	18.1	27.7	16.5	50.5	17.5	22.1	Barium	
Beryllium	µg/L	4	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	Beryllium	
Cadmium	µg/L	5	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	Cadmium	
Calcium	mg/L	--	92.0	76.5	68.0	81.3	84.5	61.1	78.8	107	75.6	65.6	63.8	63.7	58.2	58.3	61.1	63.7	78.4	63.4	71.9	59.0	63.0	Calcium	
Chloride	mg/L	SMCL: 250	93.2	18.9	21.9	56.2	72.4	3.43	45.4	164	100	39.9	14.3	8.29	2.32	6.24	4.18	13	43.1	2.91	7.57	6.82	2.66	Chloride	
Chromium, Total	µg/L	100	2.12	< 0.103	0.387	0.961	0.933	0.79	1.37	1.97	1.20	0.485	0.945	< 0.103	0.788	< 0.103	0.603	0.525	0.110	< 0.103	0.151	< 0.103	0.145	Chromium, Total	
Chromium, Hexavalent	µg/L	--	2.0	< 0.02	< 0.02	0.81	0.80	0.65	1.3	1.9	n/s	0.04	0.50	< 0.02	0.57	< 0.02	0.58	0.36	< 0.02	< 0.02	0.07	< 0.02	< 0.02	Chromium, Hexavalent	
Conductivity	umhos / cm	--	964	719	666	831	918	545	797	1230	875	705	604	569	518	539	598	587	773	553	629	552	636	Conductivity	
Copper	µg/L	1300	18.1	2.23	5.99	21.8	2.13	1.28	2.09	11.0	4.71	2.19	2.34	8.35	10.4	2.07	4.66	17.0	2.78	1.80	3.23	3.67	11.5	Copper	
Fluoride	mg/L	4	0.839	0.768	0.659	0.682	0.79	0.743	0.724	0.870	0.664	0.651	0.787	0.717	0.745	0.690	0.741	0.739	0.895	0.811	0.903	0.73	0.814	Fluoride	
Hardness (CaCO ₃)	mg/L	--	422	367	332	386	416	285	374	489	359	333	305	293	278	280	322	297	362	293	331	284	345	Hardness (CaCO ₃)	
Iron	mg/L	SMCL: 0.3	0.00278	0.0146	0.619	0.00631	0.0147	0.0114	0.0245	0.00251	0.0113	0.124	0.00369	0.221	< 0.00100	0.219	0.043	0.00311	0.172	0.185	0.0115	0.194	0.00434	Iron	
Lead	µg/L	15	< 0.103	< 0.103	< 0.103	0.206	0.203	< 0.103	0.207	< 0.103	< 0.103	< 0.103	< 0.103	0.272	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	0.174	< 0.103	< 0.103	< 0.103	Lead	
Magnesium	mg/L	--	46.7	42.6	39.4	44.3	49.8	32.2	43.2	53.8	41.4	41.2	35.5	32.5	32.2	32.7	41.2	33.5	40.2	32.8	36.7	33.3	45.5	Magnesium	
Manganese	µg/L	SMCL: 50	0.105	0.599	51.6	0.954	5.91	2.42	2.00	< 0.103	0.343	32.4	8.73	44.2	1.21	27.4	2.73	20.5	32.8	23.4	1.77	13.6	0.152	Manganese	
Mercury	µg/L	2	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	< 0.0103	Mercury	
Nickel	µg/L	100	1.98	0.997	0.832	0.999	1.22	1.18	0.847	1.20	0.678	0.754	1.05	1.16	0.669	0.545	0.548	1.12	2.50	1.23	0.964	0.555	0.591	Nickel	
Nitrogen - Nitrate	mg/L	10	3.09	0.0881	< 0.0600	1.76	2.73	1.01	4.01	3.52	2.97	< 0.0600	0.750	< 0.0600	0.481	< 0.0600	1.02	1.58	0.465	0.0831	1.71	< 0.0600	< 0.0600	Nitrogen - Nitrate	
Nitrogen - Nitrite	mg/L	1	0.222	0.215	0.205	0.156	0.250	0.252	0.179	< 0.0400	0.115	0.156	0.209	0.228	0.253	0.223	0.266	0.216	0.233	0.264	0.267	0.217	0.300	Nitrogen - Nitrite	
pH (Lab)	s.u.	--	7.54	7.58	7.48	7.57	7.64	7.52	7.63	7.61	7.69	7.42	7.69	7.63	7.90	7.79	7.93	7.53	7.49	7.51	7.58	7.56	7.72	pH (Lab)	
Selenium	µg/L	50	1.39	< 0.515	< 0.515	0.82	0.914	< 0.515	0.946	1.02	1.21	< 0.515	< 0.515	< 0.515	< 0.515	< 0.515	0.730	< 0.515	< 0.515	< 0.515	0.721	< 0.515	< 0.515	Selenium	
Silver	µg/L	SMCL: 100	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	< 0.103	Silver	
Sodium	mg/L	--	31.4	8.68	10.5	20.7	25.4	2.35	19.3	59.8	35.8	16.1	6.30	4.41	2.16	5.11	3.30	6.96	19.7	2.37	4.04	4.22	3.38	Sodium	
Strontium	µg/L	--	76.1	96.0	71.5	72.9	89.7	55.3	77.9	85.5	67.8	85.1	85.2	92.3	50.3	69.9	62.5	50.1	89.3	47.6	75.4	101	74.9	Strontium	
Sulfate	mg/L	SMCL: 250	28.1	36.4	17.9	18.5	27.9	10.5	18.1	23.3	12.1	40.0	18.0	8.38	8.52	13.7	7.04	14.0	38.3	21.3	11.9	20.3	9.23	Sulfate	
Thallium	µg/L	2	< 0.103	< 0.103	< 0.103	< 0.103	0.185	0.176	< 0.103	< 0.103	< 0.103	0.115	< 0.103	0.126	< 0.103	< 0.103	< 0.103	< 0.103	0.181	< 0.103	< 0.103	< 0.103	< 0.103	Thallium	
Total Dissolved Solids	mg/L	SMCL: 500	580	434	402	486	530	552	458	304	498	472	366	694	324	316	344	332	468	310	360	310	368	Total Dissolved Solids	
Zinc	µg/L	SMCL: 5000	16.3	8.12	17.8	10.1	12.7	17.0	9.19	14.3	18.9	13.4	11.1	10.7	10.1	13.4	11.4	26.3	11.6	16.1	9.02	11.0	7.16	Zinc	

MCL - Maximum Contaminant Level

SMCL - Secondary MCL

n/s - not sampled

