Item 2-D.

Report to Water Utility Board on Annual Water Quality Monitoring Results

September 16, 2008

Executive Summary

This report to the Water Utility Board provides a snapshot of drinking water quality for the City of Madison. Madison Water Utility delivers drinking water that continues to meet all state and federal primary drinking water standards. Water quality monitoring, which occurs at the source and at representative locations in the distribution system, significantly exceeds federal and state guidelines for contaminant monitoring. The Water Utility continues to report monitoring results in multiple media including on its website, through the Drinking Water Quality Listserv, and in the annual consumer confidence report (CCR). Also known as the drinking water quality annual report, the CCR is mailed to all Madison residents.

Introduction

The City of Madison drinking water system consists of 23 active wells, 31 reservoirs (including 5 elevated water towers), and approximately 840 miles of interconnected water transmission and distribution mains. The Water Utility pumps ground water from a deep sandstone aquifer. Wells are 500-1100 feet deep and deliver water to localized regions of the city.

The groundwater source of Madison's drinking water contributes to its quality. Organic matter, particulates, and microbes such as bacteria, algae and protozoa are naturally filtered as rainwater, snowmelt, and runoff percolate through the soil to replenish the aquifer. However, the physical and chemical properties of water allow it to dissolve minerals from the underlying rock or to pick up man-made contaminants left behind from spills or improper chemical storage as water moves from the surface to the saturated zone. All Madison drinking water contains significant amounts of hardness minerals and other dissolved solids. Consequently, area businesses and homeowners frequently employ a water softener to prevent scale buildup on pipes and to promote longer life on water appliances.

Madison Water Utility routinely collects and tests water samples for coliform bacteria and a variety of chemical substances that may be present in drinking water. Samples are collected at Water Utility facilities – wells, water towers, reservoirs, booster stations – and representative locations within the distribution system (see table 2). The location and frequency of sampling varies by contaminant (see table 1). Testing is performed to comply with the federal Safe Drinking Water Act; however, additional monitoring is performed to ensure drinking water safety, to track trends in water quality, and to better understand how the distribution system impacts water quality. The U.S. Environmental Protection Agency (EPA) and the Wisconsin Department of Natural Resources (WDNR) have regulatory authority over the water quality monitoring performed by the utility. The amount of testing performed by Madison as part of its water quality monitoring exceeds regulatory requirements set by EPA and WDNR.

Table 1. Frequency and Location of Water Quality Monitoring

Testing Frequency	Contaminants Tested	Testing Location
Daily	Chlorine, Fluoride	Unit Wells
Daily (M-Th)	Total Coliform Chlorine	Unit Wells, Distribution Sites Distribution Sites
Monthly	Iron, Manganese	Some Wells
Quarterly	Total Coliform (Raw Water) Volatile Organic Compounds	Unit Wells Some Wells
Annually	Inorganic Compounds, Nitrate Volatile Organic Compounds Disinfection By-Products	Unit Wells Unit Wells Some Distribution Sites
Less Frequently Than Annually	Synthetic Organic Compounds Radionuclides Unregulated Contaminants	Unit Wells Unit Wells Unit Wells

Microbiological Testing – Total Coliform

Coliform bacteria are an indicator of potential water contamination. This class of bacteria can be found in soil, on plant vegetation, and in feces of warm-blooded animals such as humans. Most coliform bacteria are harmless soil inhabitants that will not make people sick. However, some types of fecal coliforms (e.g. *E. coli*), which grow in the intestines of animals, may be pathogenic and can cause diarrhea, intestinal cramps, or nausea. In addition, coliform bacteria may indicate the presence of harmful bacteria or other microbes that are not as easily detected. Water samples are collected from wells and at representative distribution locations (see table 2) multiple times each week and tested for coliform bacteria. The absence of coliform bacteria indicates that the water is safe for cooking and drinking.

A positive total coliform test indicates that the water is potentially unsafe and is further evaluated for the presence of *E. coli*. If *E. coli* is present, it indicates that the water has been contaminated with fecal waste. Public notification including a boil water notice is issued until additional tests show that the water supply is free of *E. coli*. On the other hand, if a coliform-positive sample tests negative for *E. coli*, the location is re-sampled to confirm the initial test result. If the results indicate there is a potential that the system has been contaminated, the Water Utility will take immediate corrective action, and the public may be notified to boil their drinking water until additional water sample test results confirm the water is free of coliform bacteria.

Table 2. Distribution Sample Locations Tested Twice Weekly for Total Coliform

WEST SIDE SAMPLE LOCATIONS Sampled Monday & Wednesday	**EAST SIDE SAMPLE LOCATIONS** Sampled Tuesday & Thursday
Booster Station 128*	Booster Station 113
Hawks Landing Golf Course*	East High School
High Service Reservoir*	Fire Station 5*
Hill Farms Steam Plant	Glendale School
Isthmus Engineering*	Lindburg School
Jefferson Middle School	Maple Bluff Village Hall
Leopold School*	Mendota School*
Lincoln School	Reservoir 229
Midvale School	Schenk School
Orchard Ridge School	Streets Dept - East
Shorewood Fire Dept	Tower 225
Thoreau School	Tower 315
Tower 120	Truax Admin Building
Tower 126	WI Army National Guard
West High School	

* Sample location annually tested for disinfection by-products: total trihalomethanes (TTHM) and haloacetic acids (HAA5).

Routine weekly testing of water samples occurs on chlorinated water collected from wells and distribution sample locations (table 2). Based on population served, Madison Water Utility is required to collect a minimum of 120 distribution system water samples. In a typical month, the utility collects about 400 water samples for bacteriological analysis, of which 200-250 samples are from distribution system locations (see table 3). In addition, on a quarterly basis (once per three month period), the Water Utility must collect an untreated, non-chlorinated water sample from each operating well immediately after it is pumped from the ground and test these source water samples for coliform bacteria.

Table 3 shows the monthly number of routine total coliform samples collected through August. Of the 3177 total samples, only two tested coliform-positive; both were source water samples collected at Well 15 prior to chlorination. Distribution system samples collected concurrent to the coliform-positive samples at Well 15 were free of coliform bacteria. Following the detection of coliform bacteria, the well was immediately taken out of service and disinfected with chlorine. The well was placed back into service after additional water samples tested coliform-negative.

Table 3. Year-To-Date Number of Total Coliform Samples Collected

Total Coliform Samples						
	Distribution	Daily Wells	City-County	Deep Wells	Total	YTD
January	236	128	17	18	399	399
February	218	121	15	1	355	754
March	238	123	17	0	378	1132
April	254	137	18	15	424	1556
May	227	123	16	6	372	1928
June	230	145	17	3	395	2323
July	265	165	19	20	469	2792
August	221	145	16	3	385	3177
TOTAL	1889	1087	135	66	3177	

Chemical Testing

Inorganics – Inorganic compounds are rather simple chemicals present in ground water. They are generally described as mineral in nature and usually exist as ions – substances with a positive or negative charge – when dissolved in water. Typical examples include sodium, iron, calcium, magnesium, manganese, nitrate, chloride, sulfate, and zinc. Many of these inorganic chemicals are naturally occurring minerals that are dissolved from the rock/soil which make up the aquifer, or water-bearing rock formations below the soil surface. However, some of these compounds may be introduced into ground water by human activities; nitrate (an agricultural fertilizer) and sodium chloride (road salt) are two examples. The Water Utility annually tests all wells for nearly 30 different inorganic substances including all the chemicals named above plus arsenic, barium, cadmium, lead, mercury, selenium, and thallium.

Table 4 summarizes the annual inorganics test results for well samples collected in late June and early July. The table shows detections for aluminum, arsenic, lead, mercury, nickel, selenium, and thallium – substances that have not been detected in previous years. However, rather than demonstrating deteriorating water quality, these detections represent more sensitive analytical equipment capable of detecting even smaller concentrations of trace metals than was previously possible. For example, in previous years, the level of detection (LOD) for aluminum had been 20 micrograms per liter (μg/L) compared with the current LOD of 0.2 μg/L. Similarly, the LOD for many of the other trace metals has been reduced from 1.0 μg/L to 0.2 μg/L. Nearly all of the detections reported this year are within this range. Nevertheless, even at a more precise level of detection, some metals were still not detected. For example, mercury was found only at a single well, thallium at two wells, and lead at twelve wells. As the ability to detect trace contaminants continues to improve, an increasingly smaller number will replace the term "not detected".

Table 4. Summary of 2008 Annual Inorganics Results for Madison Wells

ANALYTE	UNITS	LOD	MCL	Min	Median	Mean	Max
ALKALINITY	(mg/l)	10		273	302	306	345
ALUMINUM	(µg/L)	0.2		0.44	0.79	1.3	8.1
ANTIMONY	(µg/L)	0.2	6	<0.2	<0.2	<0.2	<0.2
ARSENIC	(µg/L)	0.2	10	<0.2	0.25	0.31	1.1
BARIUM	(µg/L)	0.2	2000	8.4	19	24	57
BERYLLIUM	(µg/L)	0.2	4	<0.2	<0.2	<0.2	<0.2
CADMIUM	(µg/L)	0.2	5	<0.2	<0.2	<0.2	<0.2
CALCIUM	(mg/l)	0.01		56	69	73	97
CHLORIDE	(mg/l)	1.2		2.3	16	24	88
CHROMIUM	(µg/L)	0.2	100	<0.2	0.52	0.61	2.1
CONDUCTIVITY	umhos / cm	3		371	597	647	961
COPPER	(µg/L)	0.2	1300	1.5	3.5	6	42
FLUORIDE	(mg/l)	0.12	4	0.93	1.1	1.1	1.4
HARDNESS TOTAL (CACO3)	(mg/l)	0.07		280	339	354	456
IRON	(mg/l)	0.0014		<0.0014	0.06	0.11	0.61
LEAD	(µg/L)	0.2	15	<0.2	0.21	0.32	0.86
MAGNESIUM	(mg/l)	0.011		34	41	42	52
MANGANESE	(µg/L)	0.2		<0.2	13	19	74
MERCURY	(µg/L)	0.02	2	<0.02	<0.02	<0.02	0.03
NICKEL	(µg/L)	0.2	100	0.30	0.79	1.0	3.9
NITROGEN-Nitrate	(mg/l)	0.12	10	<0.12	0.64	1.2	3.6
NITROGEN-Nitrate&Nitrite	(mg/l)	0.18		<0.18	0.64	1.2	3.6
NITROGEN-Nitrite	(mg/l)	0.06	1	<0.06	<0.06	<0.06	<0.06
pH LAB	s.u.			7.5	7.6	7.6	7.9
SELENIUM	(µg/L)	0.2	50	<0.2	0.42	0.49	1.0
SILVER	(µg/L)	0.2		<0.2	<0.2	<0.2	<0.2
SODIUM	(mg/l)	0.027		2.2	7.1	10	31
SULFATE	(mg/l)	1.2		4.1	17	20	56
THALLIUM	(µg/L)	0.2	2	<0.2	<0.2	<0.2	0.27
TOTAL SOLIDS	(mg/l)	6		298	404	423	618
ZINC	(µg/L)	0.2		4.4	23	22	38

Results are for all wells except UW 10

Shaded boxes correspond to regulated contaminants

Iron and Manganese – Discolored water at customer taps is due to elevated levels of minerals such as iron and manganese in source water and the release of iron from the corrosion of water mains. When water is pumped from the ground, iron and manganese ions are generally in their reduced form and largely soluble. Reducing conditions in the aquifer facilitate the dissolution of iron and manganese from the water-bearing rock formations. However, contact with an oxygen rich environment or a strong oxidant such as chlorine, when the ground water is brought to the surface and disinfected, converts the mostly soluble manganese and iron ions into insoluble and colored precipitates. Within the distribution system, the black (manganese) and red (iron) solids precipitate out of the water and can accumulate in the water mains. Later, hydraulic disturbances can stir up the accumulated sediment leading to discolored water at the tap.

Monthly iron and manganese samples have been collected for nearly two years at all wells that consistently produce >20 µg/L of manganese or >0.15 mg/L of iron. Six Madison wells have

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intermediate levels of manganese, defined as ranging from 20-40 µg/L, while four wells produce water that has 40 µg/L or more of manganese (see figure 1). The secondary standard is 50 µg/L; it is the level at which aesthetic concerns such as an unpleasant taste, odor, or color may appear.

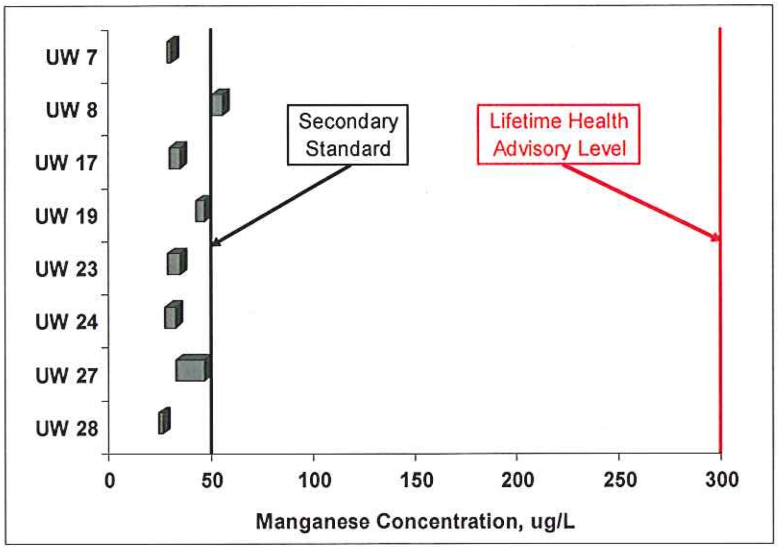

Figure 1. Range of Monthly Manganese Results for Wells Consistently Exceeding 20 µg/L

Similarly, four Madison wells produce water with intermediate levels of iron, defined as ranging from 0.15-0.25 mg/L (see figure 2). Also, four wells exceed the secondary standard of 0.3 mg/L. Because Wells 10 and 29 had only limited run time this year, they are not represented in the two figures. However, they are known to produce water that exceeds the secondary standard for both iron and manganese. The remaining wells produce water with low levels of iron and manganese. Some have no detectable level of one or both mineral. Complete results are in the appendix.

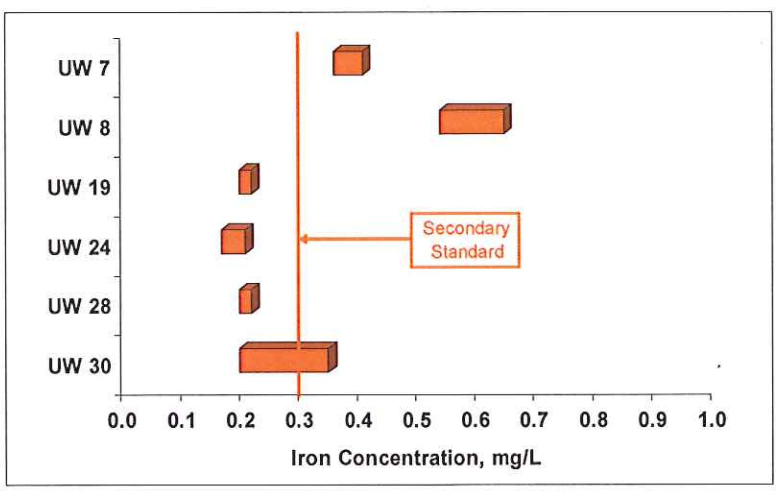

Figure 2. Range of Monthly Iron Results for Wells Consistently Above 0.15 mg/L

Volatile Organic Compounds (VOC) – Volatile organic compounds are chemical solvents or cleaning agents derived from petroleum products. They are man-made contaminants that arise from industrial processes. These contaminants leach into groundwater from improper storage, chemical spills, or wastewater discharge from industrial activities. Some can also be found in landfill leachate. Madison Water Utility annually tests all operating wells for over 40 different volatile organic compounds including carbon tetrachloride, methyl t-butyl ether (MTBE), tetrachloroethylene (PCE), and trichloroethylene (TCE). Quarterly monitoring is triggered when the level of any volatile organic compound exceeds one tenth of the maximum contaminant level (MCL), the regulatory limit of a contaminant.

The most common VOC contaminant in Madison wells is tetrachloroethylene. In 2008, PCE was detected at seven wells. Although the concentration of PCE detected at most of these wells is less than 1 part per billion (ppb), the average level found at Well 9 was 2.3 ppb while at Well 15 it was 3.1 ppb (figure 3). The MCL for tetrachloroethylene is 5 ppb. PCE has been found at these wells since the early 1990's. The amount at Well 15 appears to be trending higher while levels at Well 9 are gradually decreasing (see figure 4).

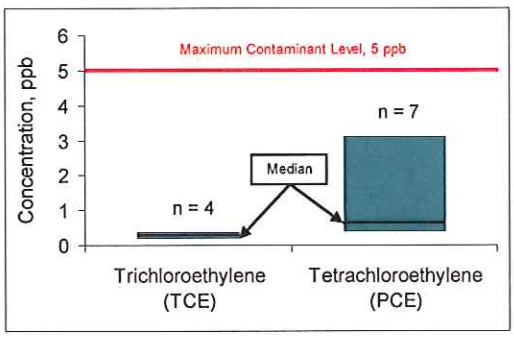

Figure 3. Range of TCE and PCE Concentrations Detected in Madison Wells

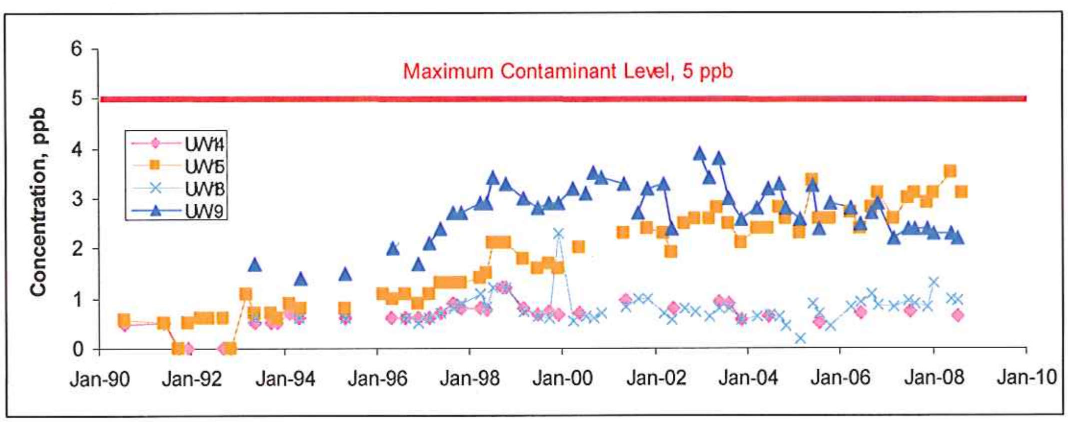

Figure 4. Tetrachloroethylene Concentrations at Wells 9, 14, 15, and 18

A limited number of other volatile organic compounds have also been found in Madison wells. Trichloroethylene was detected at trace levels (<0.5 ppb) at four wells: Wells 11, 14, 15, and 18. *Cis*-1,2-dichloroethylene was also found at low levels (<0.5 ppb) at Wells 8 and 11. The MCL for these two contaminants is 5 ppb. Finally, three unregulated VOCs were each identified in a single well: trichlorofluoromethane (Well 11), dichlorodifluoromethane (Well 14), and methyl chloride (Well 15). The concentration of each contaminant was less than 1 ppb.

Additional information on likely sources of these contaminants and their potential health impacts can be found on the websites of the Wisconsin Department of Natural Resources (WDNR) and the U.S. Environmental Protection Agency (USEPA).

Disinfection By-Products (DBP) – These chemical by-products form when chlorine combines with impurities in groundwater. Chlorine is added to treat water for the control of microbes such as bacteria and viruses. If organic matter is present, chlorine may react to form any of a variety of trihalomethanes: bromodichloromethane, bromoform, chloroform, or dibromochloromethane. The formation of disinfection by-products is limited by the amount of available organic matter, chlorine dose, temperature, and reaction time. Because little organic matter is present in ground water, the level of DBPs found in Madison drinking water is very low.

Annual samples are collected at the entry point to the distribution system and from representative locations within the distribution system. Longer reaction times cause the distribution locations to have higher trihalomethane concentrations when compared to the entry points. Figure 5 shows the range of concentrations for the four regulated trihalomethanes at distribution locations. The regulatory limit corresponds to the combined sum of the four trihalomethanes shown in figure 5 and is 80 micrograms per liter (ug/L) or parts per billion (ppb).

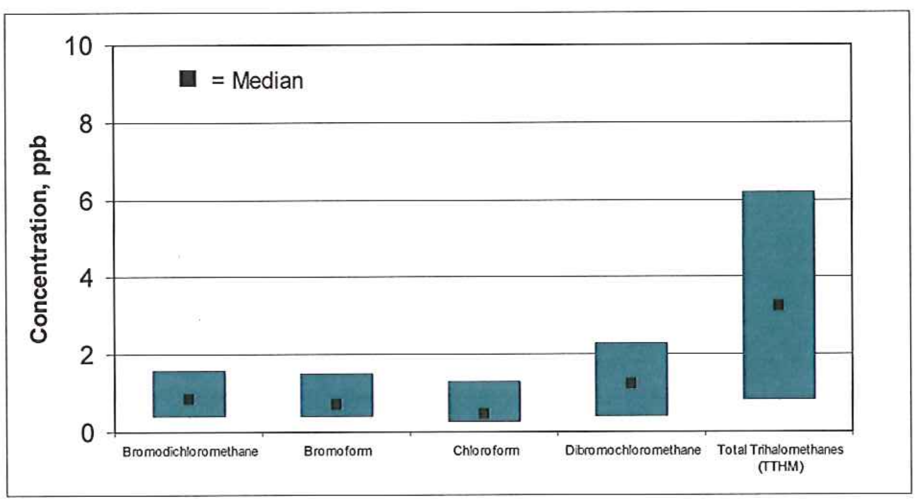

Figure 5. Range of Disinfection By-Products Measured at Distribution Locations

Figure 6 illustrates how the concentration of DBPs increases with an increase in distance from the entry point while the converse holds for volatile organics such as PCE and TCE, which tend to volatilize in the standpipe (115) and water tower (315). Station 115 is located in the Bunker Hill neighborhood while Tower 315 is located east of Interstate 90/94.

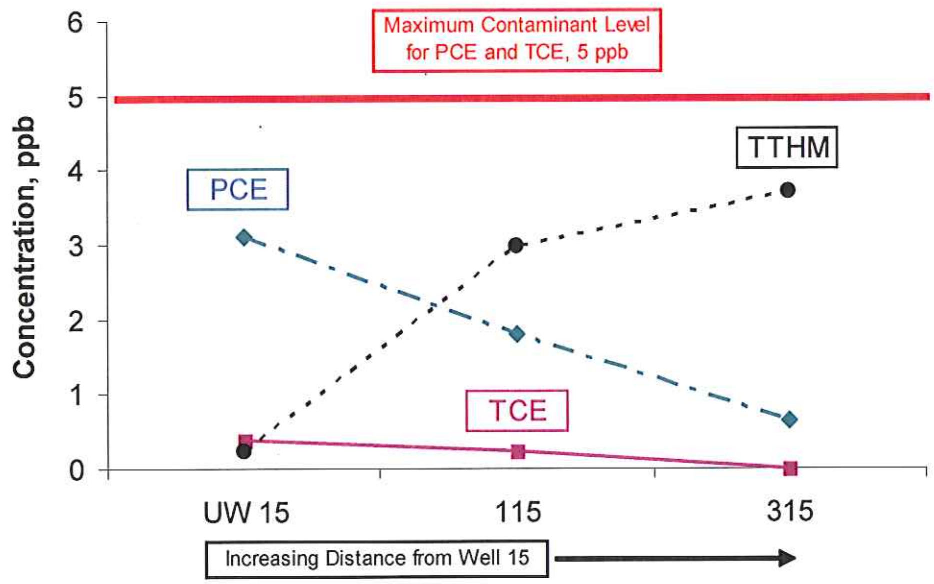

Figure 6. Distribution System Impacts on DBP and VOC Concentrations

Finally, another class of disinfection by-product, the haloacetic acids (HAA5), is tested at seven distribution locations. Of five regulated substances, only dibromoacetic acid was found in the distribution system. It ranged in concentration from below detection (<0.14 ppb) to 0.82 ppb. The regulatory limit for the combined total of the five haloacetic acids is 60 ppb.

Reporting of Water Quality Results

Water quality monitoring data are shared with the community in various ways. First, our website has a water quality link that includes a description of potential contaminants that may be found in groundwater and the frequency of testing. Additional links provide summaries of calendar year test results by contaminant class – inorganics, volatile organics, disinfection by-products, etc.

The website also has a popular application that allows customers to enter their address and learn about water quality for the specific wells that serve an address. The application links to detailed water quality reports for the individual wells identified. These reports are updated annually to include the most current water quality data available and include links to prior year results.

Another method of data sharing is the Drinking Water Quality listserv. Messages are posted to the listserv on a monthly basis and provide a review of the water quality monitoring results for the preceding month. The listserv also provides updates on the status of seasonal wells, on-going projects, upcoming public meetings, and project reports. The monthly messages are also posted to the website.

Finally, the Water Utility annually produces the consumer confidence report (CCR) or annual drinking water quality report. The report summarizes the results of water quality monitoring for the previous calendar year. Over 110,000 copies of the report are mailed to Madison residents. The report is typically mailed in early May.

In recent years, the annual drinking water quality report has been translated into Spanish. The translated report is available on the website, or customers may find copies at Centro Hispano. Paper copies are also available upon request at the Water Utility.

Conclusions

Madison drinking water continues to meet all federal and state primary drinking water standards.

Madison Water Utility collects nearly twice the number of bacteriological samples required each month for regulatory compliance. In addition, samples are routinely collected from entry points into the distribution system to confirm the safety of drinking water.

Madison drinking water is high in dissolved solids and hardness minerals due to its ground water source, a deep sandstone aquifer. Some wells produce water with elevated levels of iron and/or manganese, two minerals that can discolor drinking water.

Sodium, chloride, and nitrate concentrations in groundwater are influenced by human activities including the application of road salt (sodium chloride) and fertilizer (nitrate).

Tetrachloroethylene is the most common man-made contaminant found in Madison well water. Seven wells have detectable levels with the highest levels at Wells 9 and 15. The level of PCE found at all wells is below the maximum contaminant level.

Regulated disinfection by-products, including the trihalomethanes and haloacetic acids, are at very low levels compared to their regulatory limits.

The Water Utility relies on a variety of means to share water quality data with the community. These include our website, a subscriber-based e-mail listserv, and the drinking water quality annual report, which is mailed to all Madison residents.

APPENDIX

Table A-1. Inorganics Annual Test Results for Samples Collected in June and July 2008

INORGANIC PARAMETER	UNITS	LOD	MCL		UW 6	UW 7	UW 8	UW 9	UW 11	UW 12	UW 13	UW 14	UW 15	UW 16	UW 17
ALKALINITY	(mg/l)	10.0			315	314	300	340	336	283	304	343	321	291	285
ALUMINUM	(ug/l)	0.20			2.8	1.1	1.2	1.1	0.44	0.73	0.89	0.52	0.66	1.4	0.98
ANTIMONY	(ug/l)	0.20	6		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ARSENIC	(ug/l)	0.20	10		0.25	0.41	1.1	0.24	0.30	ND	0.21	0.29	ND	0.20	0.26
BARIUM	(ug/l)	0.20	2000		21	36	36	25	17	14	34	51	9.0	17	24
BERYLLIUM	(ug/l)	0.20	4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CADMIUM	(ug/l)	0.20	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CALCIUM	(mg/l)	0.010			81	79	68	83	83	62	66	97	85	70	71
CHLORIDE	(mg/l)	1.20			30.70	5.913	22.30	30.93	45.19	2.624	8.498	88.13	44.58	34.28	38.44
CHROMIUM	(ug/l)	0.20	100		2.1	ND	0.32	0.86	0.81	0.66	0.79	1.9	0.52	0.74	ND
CONDUCTIVITY	umhos / cm	3.00			727	674	640	733	800	522	594	961	776	371	705
COPPER	(ug/l)	0.20			4.9	5.9	8.8	7.5	1.9	1.8	5.2	11	6.4	1.9	1.9
FLUORIDE	(mg/l)	0.12	4		1.143	1.030	0.996	1.160	1.439	1.258	1.166	1.129	1.108	1.198	1.004
HARDNESS TOTAL (CACO3)	(mg/l)	0.070			383	387	334	401	421	295	334	456	406	344	371
IRON	(mg/l)	0.0014			0.009	0.353	0.609	0.006	0.017	ND	0.051	ND	0.014	0.002	0.098
LEAD	(ug/l)	0.20	15		0.48	0.42	0.71	0.29	ND	ND	ND	0.23	0.86	ND	0.37
MAGNESIUM	(mg/l)	0.011			44	46	40	47	52	34	41	52	47	41	47
MANGANESE	(ug/l)	0.20			1.4	26	53	1.4	14	0.35	12	ND	7.2	4.1	31
MERCURY	(ug/l)	0.02			ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND
NICKEL	(ug/l)	0.20	100		1.3	0.75	0.79	0.59	1.5	1.1	0.55	0.78	0.87	1.2	0.62
NITROGEN-Nitrate	(mg/l)	0.120	10		3.282	ND	ND	1.610	2.576	0.776	1.728	3.647	2.181	2.020	ND
NITROGEN-Nitrate&Nitrite	(mg/l)	0.180			3.282	ND	ND	1.610	2.576	0.776	1.728	3.647	2.181	2.020	ND
NITROGEN-Nitrite	(mg/l)	0.060	1		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
pH LAB	s.u.				7.47	7.55	7.86	7.58	7.48	7.65	7.66	7.56	7.61	7.57	7.69
SELENIUM	(ug/l)	0.20	50		1	0.26	0.22	0.80	0.8	0.20	0.48	0.96	0.74	0.38	0.32
SILVER	(ug/l)	0.20			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SODIUM	(mg/l)	0.027			11.2	6.6	10.4	13.9	16.0	2.2	4.9	30.5	17.3	13.0	16.8
SULFATE	(mg/l)	1.20			24.21	36.82	17.09	14.84	25.60	9.637	13.24	23.88	30.61	17.67	46.35
THALLIUM	(ug/l)	0.20	2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL SOLIDS	(mg/l)	6.00			456	434	416	474	550	324	374	618	522	432	508
ZINC	(ug/l)	0.20			26	4.4	27	27	23	23	17	18	14	26	27

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Table A-1, continued. Inorganics Annual Test Results for Samples Collected in June and July 2008

INORGANIC PARAMETER	UNITS	LOD	MCL		UW 18	UW 19	UW 20	UW 23	UW 24	UW 25	UW 26	UW 27	UW 28	UW 29	UW 30
ALKALINITY	(mg/l)	10.0			280	289	275	345	275	327	292	325	286	335	273
ALUMINUM	(ug/l)	0.20			0.84	1.5	0.47	0.67	0.52	0.62	8.1	0.58	0.52	1.7	0.6
ANTIMONY	(ug/l)	0.20	6		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ARSENIC	(ug/l)	0.20	10		ND	0.28	ND	0.51	0.24	0.22	0.2	0.46	0.31	0.28	ND
BARIUM	(ug/l)	0.20	2000		15	17	10	49	13	8.4	20	32	14.0	57	17
BERYLLIUM	(ug/l)	0.20	4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CADMIUM	(ug/l)	0.20	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CALCIUM	(mg/l)	0.010			67	63	56	96	58	64	66	92	63	71	58
CHLORIDE	(mg/l)	1.20			16.60	5.889	2.31	62.61	5.686	2.876	15.34	64.5	2.59	2.927	4.385
CHROMIUM	(ug/l)	0.20	100		0.58	ND	0.52	0.99	ND	0.4	0.62	ND	ND	ND	ND
CONDUCTIVITY	umhos / cm	3.00			600	541	498	878	522	587	593	894	536	570	520
COPPER	(ug/l)	0.20			1.5	5.5	2.7	3.3	1.6	3.5	42	3.5	2	2.4	6.8
FLUORIDE	(mg/l)	0.12	4		1.07	0.925	1.069	1.072	1.11	1.317	1.184	1.016	1.138	0.936	1.066
HARDNESS TOTAL (CACO3)	(mg/l)	0.070			332	297	280	454	293	345	313	436	301	321	289
IRON	(mg/l)	0.0014			ND	0.189	ND	0.069	0.181	0.089	0.026	0.095	0.187	0.14	0.195
LEAD	(ug/l)	0.20	15		ND	ND	0.22	0.25	0.2	ND	0.66	ND	0.32	ND	ND
MAGNESIUM	(mg/l)	0.011			40	34	34	52	36	45	36	50	35	35	35
MANGANESE	(ug/l)	0.20			0.77	41	0.97	29	30	11	4.1	44	24	74	14
MERCURY	(ug/l)	0.02			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NICKEL	(ug/l)	0.20	100		0.5	0.85	0.36	3	0.3	0.48	0.82	3.9	0.75	1.3	0.41
NITROGEN-Nitrate	(mg/l)	0.120	10		1.334	ND	0.327	3.104	ND	0.499	2.087	0.359	ND	0.218	ND
NITROGEN-Nitrate&Nitrite	(mg/l)	0.180			1.334	ND	0.327	3.104	ND	0.499	2.087	0.359	ND	0.218	ND
NITROGEN-Nitrite	(mg/l)	0.060	1		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
pH LAB	s.u.				7.69	7.7	7.74	7.55	7.7	7.6	7.83	7.51	7.5	7.64	7.73
SELENIUM	(ug/l)	0.20	50		0.46	ND	0.35	0.89	0.26	0.73	0.45	0.52	ND	0.27	ND
SILVER	(ug/l)	0.20			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SODIUM	(mg/l)	0.027			7	3.7	2.2	21.7	4.8	3.2	7.1	28.9	2.3	2.9	3.7
SULFATE	(mg/l)	1.20			16.96	6.956	8.017	27.3	13.26	7.382	14.06	55.62	17.78	4.128	17.08
THALLIUM	(ug/l)	0.20	2		ND	ND	ND	0.23	ND	ND	ND	0.27	ND	ND	ND
TOTAL SOLIDS	(mg/l)	6.00			392	324	298	578	320	352	380	574	326	344	320
ZINC	(ug/l)	0.20			18	25	24	35	18	16	38	21	23	6.4	20

Table A-2. Monthly Well Samples – Manganese Levels

Manganese Concentration, ug/L								
	January	February	March	April	May	June	July	August
UW 6	n/s	n/s	n/s	n/s	n/s	1.4	1.5	2.2
UW 7	26	27	n/s	28	n/s	26	26	27
UW 8	n/s	n/s	n/s	n/s	n/s	53	52	48
UW 9	0.9	n/s	n/s	n/s	1.8	1.4	1.5	1.6
UW 11	16	17	14	17	12	14	16	12
UW 12	1.2	n/s	n/s	n/s	0.4	0.35	0.3	<0.19
UW 13	11	n/s	n/s	n/s	n/s	12	11	
UW 14	0.4	n/s	n/s	n/s	n/s	<0.2	<0.19	<0.19
UW 15	6.5	n/s	n/s	n/s	n/s	7.2	7	
UW 16	<0.19	n/s	n/s	n/s	n/s	4.1	0.4	<0.19
UW 17	n/s	n/s	n/s	n/s	32	31	32	27
UW 18	1.1	n/s	n/s	n/s	n/s	0.77	0.7	3.1
UW 19	42	44	40	43	40	41	44	40
UW 20	0.8	n/s	n/s	n/s	1.4	0.97	0.9	3
UW 23	29	30	32	31	26	29	28	26
UW 24	27	28	28	29	26	30	28	25
UW 25	8.9	n/s	n/s	n/s	n/s	11	12	9.1
UW 26	9.1	n/s	n/s	n/s	3.4	4.1	2.3	18
UW 27	n/s	n/s	n/s	n/s	n/s	44	35	30
UW 28	22	23	24	23	22	24	24	24
UW 29	n/s	n/s	n/s	n/s	n/s	74	85	209
UW 30	15	14	14	15	20	14	14	15

Table A-3. Monthly Well Samples – Iron Levels

	Iron Concentration, mg/L							
	January	February	March	April	May	June	July	August
UW 6	n/s	n/s	n/s	n/s	n/s	0.009	0.010	0.032
UW 7	0.362	0.387	n/s	0.402	n/s	0.353	0.373	0.381
UW 8	n/s	n/s	n/s	n/s	n/s	0.609	0.638	0.528
UW 9	<0.0014	n/s	n/s	n/s	0.007	0.006	0.008	0.006
UW 11	0.016	0.015	0.015	0.017	0.019	0.017	0.019	0.017
UW 12	0.005	n/s	n/s	n/s	0.002	<0.0014	0.002	<0.0014
UW 13	0.057	n/s	n/s	n/s	n/s	0.051	0.045	n/s
UW 14	<0.0014	n/s	n/s	n/s	n/s	<0.0014	<0.0014	<0.0014
UW 15	0.016	n/s	n/s	n/s	n/s	0.014	0.014	n/s
UW 16	0.009	n/s	n/s	n/s	n/s	0.002	0.003	<0.0014
UW 17	n/s	n/s	n/s	n/s	0.078	0.098	0.100	0.106
UW 18	<0.0014	n/s	n/s	n/s	n/s	<0.0014	<0.0014	<0.0014
UW 19	0.209	0.205	0.185	0.210	0.198	0.189	0.201	0.204
UW 20	0.002	n/s	n/s	n/s	<0.0014	<0.0014	<0.0014	0.009
UW 23	0.062	0.064	0.067	0.069	0.063	0.069	0.060	0.059
UW 24	0.195	0.199	0.175	0.175	0.160	0.181	0.200	0.179
UW 25	0.079	n/s	n/s	n/s	n/s	0.089	0.085	0.066
UW 26	0.031	n/s	n/s	n/s	0.003	0.026	0.053	0.085
UW 27	n/s	n/s	n/s	n/s	n/s	0.095	0.101	0.135
UW 28	0.207	0.195	0.202	0.205	0.195	0.187	0.201	0.204
UW 29	n/s	n/s	n/s	n/s	n/s	0.140	0.229	0.360
UW 30	0.221	0.194	0.198	0.224	0.339	0.195	0.198	0.227

Table A-4. Volatile Organic Compound Test Results for Water Utility Facilities

VOLATILE ORGANIC COMPOUND	UNITS	MCL	Well	6	7	8	9	9	9	11	12	13	14	15	15	15	16	17	18	18	18	19
			Date	7/10	7/10	7/10	1/11	5/21	7/9	6/26	7/10	7/10	7/8	1/11	5/21	8/12	8/11	7/9	1/9	5/21	7/9	7/8
Benzene	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane*	ppb	80		ND	[0.55]	0.61	[0.40]	[0.48]	[0.39]	ND	ND	ND	ND	ND	ND	ND	ND	0.93	ND	ND	ND	1.8
Bromoform*	ppb	80		[0.25]	ND	ND	[0.43]	[0.50]	[0.45]	[0.28]	ND	ND	[0.34]	[0.23]	[0.28]	[0.24]	ND	[0.21]	ND	ND	ND	ND
Bromomethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform*	ppb	80		ND	[0.44]	0.63	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[0.62]	ND	ND	ND	2.3
Chloromethane (Methyl Chloride)	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[0.34]	ND	ND	ND	ND	ND	ND
o-Chlorotoluene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Chlorotoluene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane*	ppb	80		ND	[0.44]	[0.38]	[0.73]	0.81	[0.74]	[0.27]	ND	ND	[0.25]	[0.25]	[0.27]	ND	ND	[0.79]	[0.31]	[0.24]	ND	0.88
Dibromomethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m-Dichlorobenzene (1,3)	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Dichlorobenzene (1,2)	ppb	600		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Dichlorobenzene (1,4)	ppb	75		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	[0.26]	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
1,1-Dichloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	ppb	7		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene (cis)	ppb	70		ND	ND	[0.26]	ND	ND	ND	[0.39]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene (trans)	ppb	100		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloromethane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[0.65]^	[0.52]^	ND	ND	ND	ND	ND
1,2-Dichloropropane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ppb	700		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
Isopropylbenzene	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
p-Isopropyltoluene	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
Methyl t-butyl ether	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/r	ND	ND	ND
Monochlorobenzene	ppb	100		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
Styrene	ppb	100		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	ppb	5		0.46	ND	ND	2.3	2.3	2.2	0.60	ND	ND	0.65	3.1	3.5	3.10	ND	ND	1.3	0.99	0.97	ND
Toluene	ppb	1000		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ppb	70		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ppb	200		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	ppb	5		ND	ND	ND	ND	ND	ND	[0.29]	ND	ND	[0.28]	[0.33]	[0.39]	[0.38]	ND	ND	[0.19]	ND	ND	ND
Trichlorofluoromethane	ppb	--		n/r	n/r	n/r	ND	ND	n/r	0.98	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
1,2,3-Trichloropropane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlortrifluoroethane	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
1,2,4-Trimethylbenzene	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
1,3,5-Trimethylbenzene	ppb	--		n/r	n/r	n/r	ND	ND	n/r	n/r	n/r	n/r	n/r	ND	ND	ND	ND	n/r	n/r	ND	n/r	n/r
Vinyl Chloride	ppb	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene, Total	ppb	10000		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

* Disinfection By-Product
^ Laboratory Contaminant
Bracketed numbers indicate that the contaminant was detected but measured below the Level of Quantification (LOQ)

ND = Not Detected
n/r = Not Reported

Table A-4, Continued. Volatile Organic Compound Test Results for Water Utility Facilities

VOLATILE ORGANIC COMPOUND	UNITS	MCL[2]	Well	20	23	24	25	26	27	28	28	29	30	106	115	115	115	215	315	315	229	229
			Date	7/8	6/26	7/9	6/26	7/8	7/8	5/21	7/8	6/26	1/9	5/21	1/11	5/21	8/12	1/11	5/21	8/12	1/11	5/21
Benzene	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane*	ppb	80		ND	[0.31]	1.2	ND	[0.49]	[0.22]	ND	[0.23]	1.3	ND	1.5	[0.57]	0.81	[0.70]	[0.57]	0.79	0.86	1.0	0.95
Bromoform*	ppb	80		ND	0.60	[0.21]	ND	[0.28]	[0.21]	ND	ND	[0.17]	ND	1.5	0.90	1.3	0.82	0.84	1.1	0.98	0.72	[0.65]
Bromomethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform*	ppb	80		ND	ND	[0.67]	ND	[0.25]	ND	ND	ND	1.3	ND	0.88	ND	[0.28]	[0.25]	[0.21]	[0.28]	[0.35]	[0.42]	[0.44]
Chloromethane (Methyl Chloride)	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Chlorotoluene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Chlorotoluene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane*	ppb	80		ND	0.77	1.1	ND	[0.63]	[0.35]	ND	ND	0.82	ND	2.3	1.2	1.6	1.2	1.2	1.5	1.5	1.4	1.3
Dibromomethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m-Dichlorobenzene (1,3)	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Dichlorobenzene (1,2)	ppb	600		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Dichlorobenzene (1,4)	ppb	75		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	ppb	7		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene (cis)	ppb	70		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene (trans)	ppb	100		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloromethane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[0.61]^	ND	ND	[0.59]^	ND	ND
1,2-Dichloropropane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropene	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ppb	700		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl t-butyl ether	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
Monochlorobenzene	ppb	100		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ppb	100		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	ppb	5		ND	ND	ND	ND	ND	[0.38]	ND	ND	ND	ND	[0.30]	1.7	1.8	1.8	1.6	0.95	0.64	ND	ND
Toluene	ppb	1000		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ppb	70		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ppb	200		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	ppb	5		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[0.21]	[0.20]	[0.24]	ND	ND	ND	ND	ND
Trichlorofluoromethane	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ppb	--		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlortrifluoroethane	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ppb	--		n/r	n/r	n/r	n/r	n/r	n/r	ND	n/r	n/r	n/r	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ppb	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene, Total	ppb	10000		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[0.61]	ND	ND	ND	ND	ND

* Disinfection By-Product
^ Laboratory Contaminant
Bracketed numbers indicate that the contaminant was detected but measured below the Level of Quantification (LOQ)

ND = Not Detected
n/r = Not Reported

Table A-5. Disinfection By-Products Measured at Distribution System Locations

Disinfection By-Products	UNITS	MCL		HSR	128	HLGC	IEM	FS-5	MDS	LS
			Date	8/11	8/11	8/11	8/11	8/12	8/12	8/11
Bromodichloromethane	ppb	--		ND	0.57	1.6	1.3	[0.37]	ND	0.68
Bromoform	ppb	--		[0.44]	ND	[0.46]	0.72	0.76	ND	[0.37]
Chloroform	ppb	--		ND	[0.37]	1.3	0.65	ND	ND	[0.51]
Dibromochloromethane	ppb	--		[0.37]	[0.56]	1.3	1.5	0.88	ND	0.67
Total Trihalomethanes (TTHM)		80		0.81	1.5	4.7	4.2	2.0	0.0	2.2
Dibromoacetic acid	ppb	--		[0.36]	ND	0.53	0.82	0.72	ND	[0.24]
Dichloroacetic acid	ppb	--		ND	ND	ND	ND	ND	ND	ND
Monobromoacetic acid	ppb	--		ND	ND	ND	ND	ND	ND	ND
Monochloroacetic acid	ppb	--		ND	ND	ND	ND	ND	ND	ND
Trichloroacetic acid	ppb	--		ND	ND	ND	ND	ND	ND	ND
Total Haloacetic Acid (HAA5)		60		0.36	0.0	0.53	0.82	0.72	0.0	0.24

Bracketed numbers indicate that the contaminant was detected but measured below the Level of Quantification (LOQ)

KEY:

HSR - High Service Reservoir (106)
128 - Booster 128
HLGC - Hawk's Landing Golf Course
IEM - Isthmus Engineering
FS-5 - Fire Station 5
MDS - Mendota School
LS - Leopold School