

# **Annual Report on Water Quality Monitoring - 2009**

Prepared by Joseph Grande

January 8, 2010

## *Executive Summary*

This report provides a snapshot of drinking water quality for the City of Madison. The water utility delivers drinking water that meets all state and federal primary drinking water standards. Water quality monitoring, which occurs at the source and at representative locations within the distribution system, significantly exceeds federal and state guidelines. Madison 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).

## *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-using 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 & figure A-1). The location and frequency of sampling varies by contaminant (see table 1). Monitoring complies with the federal Safe Drinking Water Act, as enforced by the Wisconsin Department of Natural Resources (DNR), while additional testing is performed to ensure drinking water safety, to track trends in water quality, and to better understand distribution system water quality. The U.S. Environmental Protection Agency (EPA) and DNR 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 the regulatory requirements set by both agencies.

Table 1. Frequency and locations 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

Table 2. Distribution (compliance) 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	

\* Tested annually for disinfection by-products (DBP) – trihalomethanes and haloacetic acid

## Microbiological Testing – Total Coliform

Coliform bacteria tests are an indicator of water safety; tests showing the presence of the bacteria indicate that the water may not be safe for human consumption. Coliforms are a class of bacteria that may be found in soil, on vegetation, or in feces of warm-blooded animals such as humans. Most coliforms are harmless soil organisms that do not make people sick. However, some types of fecal coliforms (e.g. *E. coli*), which grow in the intestines of animals, may be disease-causing and can lead to diarrhea, intestinal cramps, or nausea. Coliform bacteria may also indicate the presence of other harmful bacteria or 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 human use such as for cooking and drinking.

Based on population served, Madison Water Utility is required to collect a minimum of 150 distribution system water samples each month and have them tested for coliform bacteria. 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 the water 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 in 2009. Of 4660 bacteriological samples, three tested positive for coliform bacteria. Follow-up samples did not show the presence of bacteria at the original or check sample locations. Compared to federal and state regulations, which require that not more than 5% of monthly samples are coliform positive, the frequency of positive test results [highest monthly total was <0.5%] is very low.

Table 3. Monthly number of total coliform samples collected in 2009.

	Compliance	Deep Wells	City-County	Wells - PH	Total	YTD
January	216	11	15	111	353	353
February	224	5	14	115	358	711
March	259	2	18	125	404	1115
April	251	0	18	138	407	1522
May	206	18	15	118	357	1879
June	245	5	17	155	422	2301
July	255	0	19	156	430	2731
August	240	22	17	145	424	3155
September	241	0	15	137	393	3548
October	248	19	18	130	415	3963
November	219	0	16	107	342	4305
December	230	0	17	108	355	4660
<b>TOTAL</b>	<b>2834</b>	<b>82</b>	<b>199</b>	<b>1545</b>	<b>4660</b>	

## Chemical Treatment – Fluoride

Fluoride is added to Madison tap water to improve dental health and reduce tooth decay. Water is tested daily to achieve a target level of 1.1 mg/L fluoride. In 2009, the average system-wide fluoride concentration was 1.12 mg/L. Table 4 shows the number of samples collected at each well, the average concentration observed at the well, and the number of samples that fell outside the normal operating range of 0.6-1.6 mg/L.

Table 4. Summary of test results, measured in mg/L, after fluoride addition at Madison wells.

Well	Samples	5th Pct	50th Pct	95 Pct	<0.6	>1.6
6	62	0.90	1.05	1.17	2	0
7	91	0.95	1.07	1.21	0	0
8	30	0.94	1.03	1.10	0	0
9	363	0.94	1.11	1.30	0	0
11	225	1.00	1.16	1.31	1	0
12	249	1.01	1.17	1.35	3	0
13	362	1.01	1.18	1.38	1	0
14	363	0.99	1.11	1.29	2	1
15	208	0.92	1.16	1.43	0	1
16	177	0.93	1.06	1.24	0	0
17	105	0.84	1.14	1.25	4	0
18	220	0.82	1.02	1.15	0	0
19	227	1.01	1.17	1.37	0	0
20	361	0.90	1.03	1.24	6	0
23	201	0.99	1.11	1.27	1	0
24	240	1.00	1.14	1.29	0	0
25	344	0.96	1.12	1.31	2	2
26	365	0.98	1.14	1.33	0	0
27	170	1.04	1.17	1.37	0	0
28	78	1.06	1.18	1.34	0	0
29	249	0.89	1.04	1.21	1	0
30	358	0.94	1.09	1.28	0	0
<b>TOTAL</b>	<b>5048</b>	<b>--</b>	<b>1.12</b>	<b>--</b>	<b>23</b>	<b>4</b>

Over 5000 fluoride measurements were made at Madison municipal wells in 2009. Figure 1 shows the distribution of the test results. Nearly 91% of the 2009 test results fell between 0.9 and 1.3 mg/L fluoride, up from 76% in 2008 (table 5). The utility has set a 2010 target of 95% for the frequency of samples falling within the 0.9 – 1.3 mg/L range.

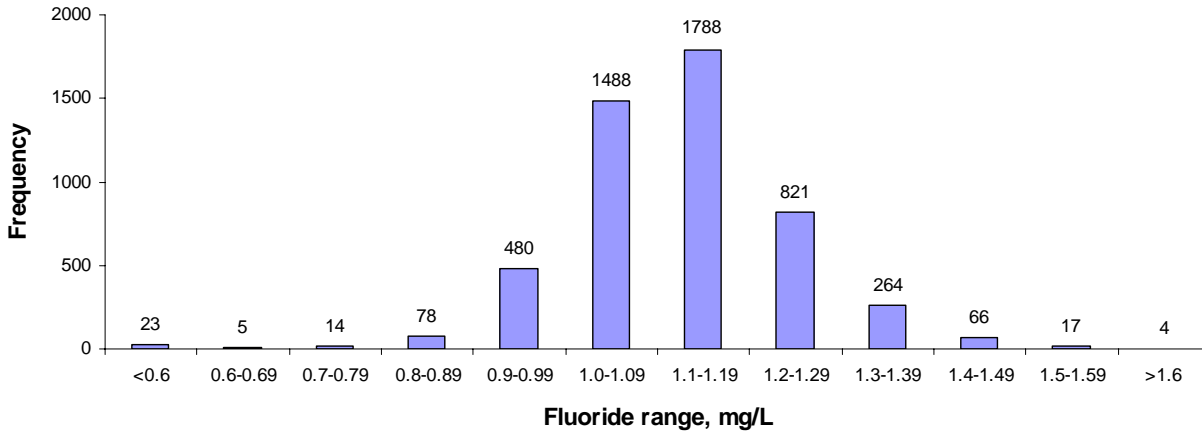


Figure 1. Distribution of fluoride test results, after fluoride addition, at Madison wells.

Table 5. Comparison of 2008 and 2009 fluoride test results at Madison wells.

Fluoride Range	2008 Results		2009 Results		Change Samples, N
	Samples, N	Samples, %	Samples, N	Samples, %	
<0.9	331	6.1%	120	2.4%	-211
0.9-0.99	465	8.6%	480	9.5%	15
1.0-1.09	1043	19%	1488	29%	445
1.1-1.19	1406	26%	1788	35%	382
1.2-1.29	1152	21%	821	16%	-331
>1.29	1002	19%	351	7.0%	-651

### 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 its wells for nearly 30 different inorganic substances including all the chemicals named above plus arsenic, barium, cadmium, lead, mercury, selenium, and thallium.

Table 6 summarizes the annual inorganic test results for well samples collected in late June and early July. With few exceptions, notably nitrate, the regulated inorganic contaminants that were detected are found at levels near the detection limit, generally below 1 ug/L [or part per billion], and well below the allowable limit [maximum contaminant level, MCL]. Complete test results can be found in the appendix.

Table 6. Summary of annual inorganic test results after chemical treatment for Madison wells

Analyte	Units	LOD	MCL	Minimum	Median	Maximum
ALKALINITY	(mg/l)	10.0		266	305	371
ALUMINUM	(ug/l)	0.20		0.45	0.77	2.0
ANTIMONY	(ug/l)	0.20	6	<0.20	<0.20	0.24
ARSENIC	(ug/l)	0.20	10	<0.20	0.30	0.69
BARIUM	(ug/l)	0.20	2000	7.8	18	64
BERYLLIUM	(ug/l)	0.20	4	<0.20	<0.20	<0.20
CADMIUM	(ug/l)	0.20	5	<0.20	<0.20	<0.20
CALCIUM	(mg/l)	0.02		57	70	105
CHLORIDE	(mg/l)	1.20		1.6	12	103
CHROMIUM	(ug/l)	0.20	100	0.26	0.84	2.5
CONDUCTIVITY	umhos / cm	3.00		503	632	1053
COPPER	(ug/l)	0.20	1300	1.3	3.3	43
FLUORIDE	(mg/l)	0.12	4	<0.12	1.0	1.2
HARDNESS TOTAL (CACO3)	(mg/l)	0.07		284	350	489
IRON	(mg/l)	0.0009		<0.0009	0.03	0.63
LEAD	(ug/l)	0.20	15	<0.20	<0.20	0.54
MAGNESIUM	(mg/l)	0.014		34	41	55
MANGANESE	(ug/l)	0.20		<0.20	14	55
MERCURY	(ug/l)	0.02	2	<0.02	0.04	0.12
NICKEL	(ug/l)	0.20	100	0.37	0.87	3.1
NITROGEN-Nitrate	(mg/l)	0.12	10	<0.12	0.46	3.9
NITROGEN-Nitrite	(mg/l)	0.06	1	<0.06	<0.06	<0.06
ORTHOPHOSPHORUS	(mg/l)	0.01		<0.01	<0.01	0.02
pH LAB	s.u.			7.4	7.6	7.8
SELENIUM	(ug/l)	0.20	50	<0.20	0.22	1.0
SILVER	(ug/l)	0.20		<0.20	<0.20	<0.20
SODIUM	(mg/l)	0.025		2.3	6.6	35
SULFATE	(mg/l)	1.20		3.6	17	57
THALLIUM	(ug/l)	0.10	2	<0.10	0.10	0.26
TOTAL SOLIDS	(mg/l)	6.00		277	376	675
ZINC	(ug/l)	0.20		0.9	4.6	15

Shaded boxes correspond to regulated contaminants  
 Results are a summary for all wells except UW 10

LOD - Limit of Detection  
 MCL - Maximum Contaminant Level

**Nitrate** - Nitrate is a nutrient needed for normal plant growth. Fertilizer application, barnyard runoff, and septic systems can increase the amount of nitrate in soil and groundwater. Shallow wells located next to or downhill from farmland or septic fields are more vulnerable to nitrate contamination. Figure 2 shows nitrate results for Madison wells compared to the MCL. Nitrate

levels are highest in wells drilled prior to 1968 [wells #6 – #17, #23]; six of these wells have nitrate that exceeds 2 mg/L. Half of the newer wells have no nitrate and only one had nitrate above 1 mg/L. Nitrate trends have been stable over the last five years at Madison wells.

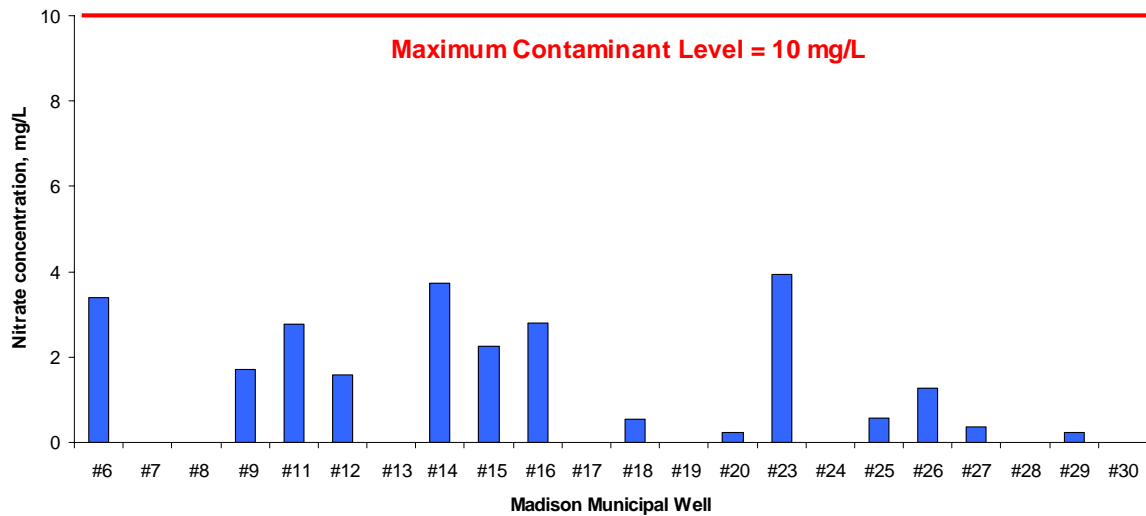


Figure 2. Nitrate levels at Madison wells.

**Sodium and Chloride** – Elevated levels of sodium and chloride (salt) in groundwater are usually attributed to the use of road salt associated with snow clearing operations. Increasing trends for these chemicals in Madison lakes and some municipal wells has been well documented by Public Health – Madison & Dane County. Figure 3 shows current levels for Madison’s wells. Similar to nitrate, the levels are higher at wells drilled prior to 1968, with the highest levels observed at wells #14 and #23. At these two wells, sodium exceeds the EPA’s Drinking Water Equivalency Level – the lifetime exposure concentration believed to be protective of adverse health effects.

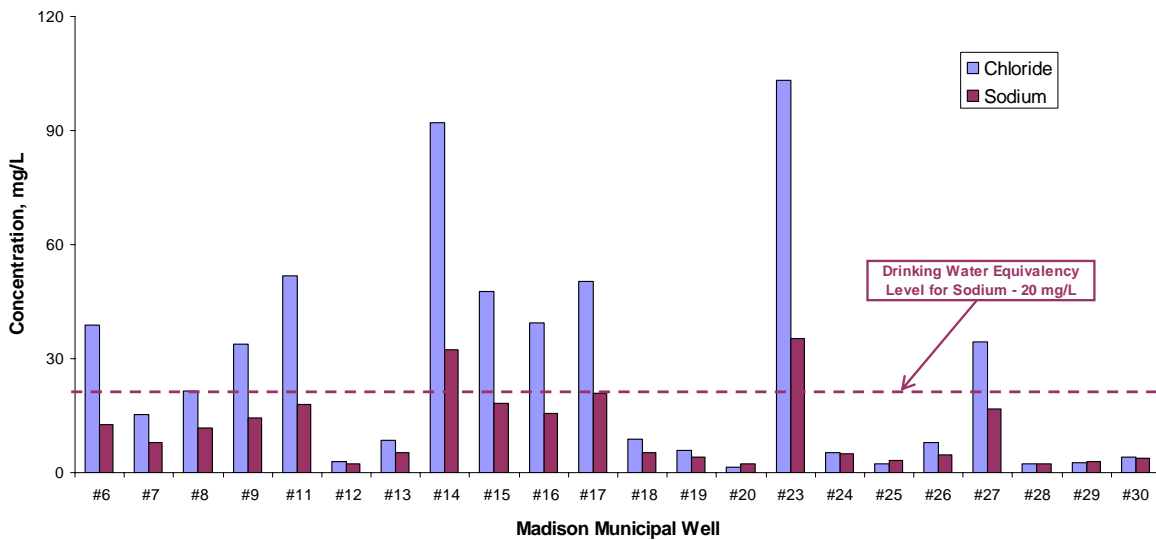


Figure 3. Sodium and chloride levels at Madison wells.

**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 particles. Within the distribution system, the black (manganese) and orange (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.

Routine monthly samples are collected at wells that consistently have iron and manganese above 0.15 mg/L and 20 µg/L, respectively. Five Madison wells produce water with an intermediate amount of iron, defined as ranging from 0.15-0.25 mg/L, (figure 4) while two wells exceed the national secondary drinking water standard of 0.3 mg/L – a level above which aesthetic concerns such as an unpleasant taste, odor, or appearance (color) may be present in the water.

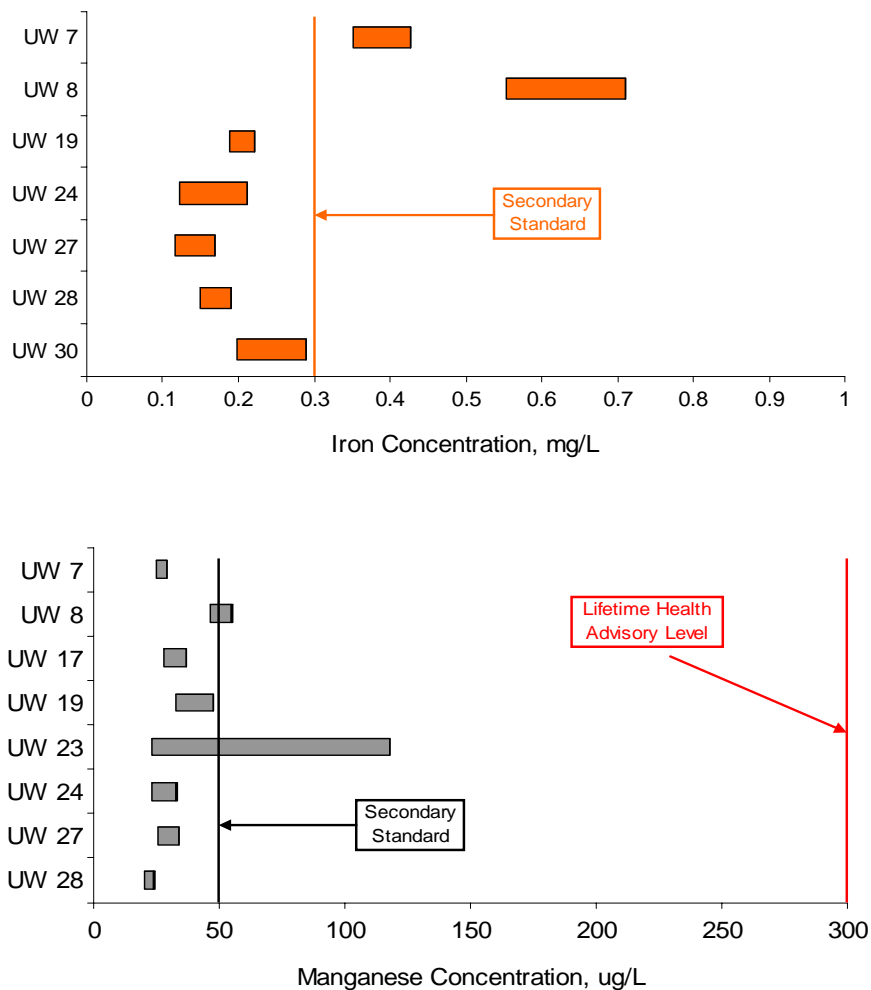


Figure 4. Range of results for wells with intermediate to elevated levels of iron and manganese.

Six Madison wells have intermediate levels of manganese, defined as ranging from 20-40 µg/L, while two wells produce water with more than 40 µg/L of manganese (figure 4). The other wells produce water with low levels of iron and manganese, including some with no detectable amount of one or both mineral (table 7). Data for wells #10 and #29 are not represented in this section because the well either did not operate this year (#10) or the water was filtered before delivery to the distribution system (#29). Complete results can be found in the appendix. For all Madison wells, manganese is well below the EPA’s Lifetime Health Advisory Level – the concentration below which no adverse health effects are expected following a lifetime of exposure [assuming two liters of water per day for a 70-kg adult] – which is 300 µg/L of manganese.

Table 7. Summary statistics for monthly iron and manganese test results.

	Samples	MANGANESE (ppb)			IRON (ppm)		
		Mean	Median	St Dev	Mean	Median	St Dev
UW 6	4	0.9	0.9	0.1	0.008	0.008	0.002
UW 7	9	27	27	1.1	0.382	0.376	0.025
UW 8	4	51	51	4.2	0.614	0.597	0.074
UW 9	4	0.7	0.7	0.1	<0.0009	<0.0009	0.000
UW 11	4	1.3	1.2	0.5	0.004	0.005	0.002
UW 12	2	0.3	0.3	0.1	0.002	0.002	0.001
UW 13	4	12	12	0.6	0.051	0.052	0.004
UW 14	2	0.3	0.3	0.1	<0.0009	<0.0009	0.000
UW 15	4	7.5	6.5	3.3	0.021	0.018	0.010
UW 16	2	<0.2	<0.2	0.0	0.004	0.004	0.002
UW 17	4	31	29	4.4	0.094	0.092	0.009
UW 18	4	4.1	4.1	3.2	0.020	0.010	0.025
UW 19	11	41	42	4.4	0.203	0.204	0.010
UW 20	4	0.9	0.9	0.1	<0.0009	<0.0009	0.000
UW 23	9	39	27	31	0.122	0.072	0.129
UW 24	12	28	29	3.0	0.162	0.161	0.027
UW 25	4	7.9	8.0	0.9	0.038	0.033	0.024
UW 26	12	21	14	17	0.053	0.024	0.068
UW 27	9	30	29	2.8	0.155	0.160	0.016
UW 28	4	22	22	1.6	0.174	0.178	0.018
UW 29*	66	2.8	1.5	3.2	0.014	0.009	0.012
UW 30	12	14	14	0.9	0.214	0.202	0.028

\* Filtered water pumped to the distribution system

**Radium and Other Radionuclides** – In April 2009, the water utility satisfied its radionuclide monitoring requirements for collecting samples at each entry point to the distribution system. One-time grab samples were collected in June 2008 or September 2008 at wells #7, #10, #19, #23, #27, #28, and #29; composite samples were collected at the remaining wells. Composite samples involve collecting a sample during each of four consecutive quarters (each three-month period) and then combining the four sub-samples prior to submitting one sample for analysis. Compositing at each well began in June 2008 and continued through April 2009. Both sample types were tested for radioactive elements including radium and uranium, and other measures of gross radioactivity. Test results are summarized in table 8. All wells tested below the MCL for each radioactive element tested.

Table 8. Range of measurements for radionuclide contaminants at Madison wells.

	Gross Alpha pCi/L	Gross Beta pCi/L	Radium-226 pCi/L	Radium-228 pCi/L	Uranium ug/L
<b>Minimum</b>	1.1	1.4	0.06	0.25	0.29
<b>Median</b>	3.5	3.3	0.64	0.87	0.83
<b>Maximum</b>	10.3	11.8	2.7	3.8	2.0
<b>MCL</b>	<b>15</b>	<b>50</b>	<b>5*</b>	<b>5*</b>	<b>30</b>

MCL - Maximum Contaminant Level

\* MCL for combined radium (226+228) is 5 pCi/L

Naturally occurring, radioactive elements are found in rock, soil, water, and air. They derive from the creation of our planet and enter our bodies when we drink water, breathe air, and eat foods that contain these elements. Everyone is exposed to some level of radiation in everyday life. For example, uranium and thorium are found in rock and soil. In time, they decay to other elements including radium, which later decays to radon gas. Radon is the largest contributor to our daily exposure of radiation from the natural world. More information about radium and radon is available from the Agency for Toxic Substances and Disease Registry (ATSDR) and the Environmental Protection Agency (EPA).

**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 its wells for over 40 different volatile organic compounds including carbon tetrachloride, tetrachloroethylene (PCE), trichloroethylene (TCE), and methyl t-butyl ether (MTBE). Quarterly monitoring is triggered when the level of any VOC exceeds one tenth of the MCL, the regulatory limit of a contaminant.

The most common VOC contaminant in Madison wells is tetrachloroethylene (PCE). In 2009, PCE was detected at seven wells (table 9). Although the concentration of PCE detected at most wells is less than 1 ug/L [part per billion (ppb)], the average level at well #9 was 2.1 ug/L while at well #15 it was 3.7 ug/L. These levels compare to an MCL of 5 ug/L. Present since the early 1990's, the amount at well #15 appears to be trending higher while the level at well #9 is stable or gradually decreasing (figure 6).

Table 9. Range of tetrachloroethylene, measured in ug/L, observed at Madison wells in 2008 and 2009. No PCE was detected at the other 16 wells.

WELL	2008		2009	
	Minimum	Maximum	Minimum	Maximum
6	0.46	0.46	0.49	0.49
9	2.1	2.3	2.0	2.2
11	0.53	0.60	0.54	0.75
14	0.65	0.70	0.68	0.76
15	3.1	3.5	3.4	3.9
18	0.80	1.3	0.93	3.5
27	0.38	0.38	0.24	0.31

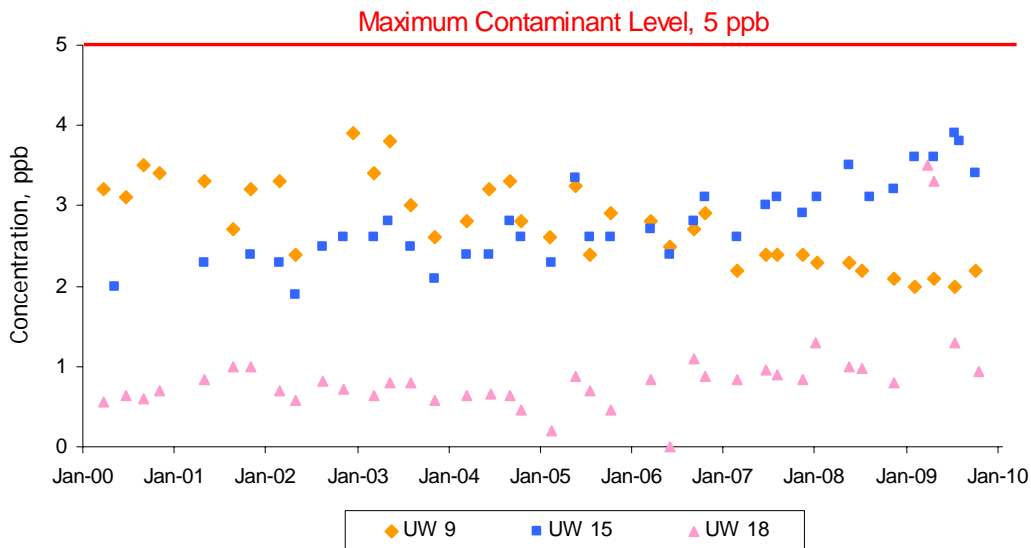


Figure 6. Tetrachloroethylene trends at wells #9, #15, and #18

A limited number of other volatile organic compounds have also been found in Madison wells. They include trichloroethylene (TCE) and *cis*-1,2-dichloroethylene, each detected at trace levels (<0.4 ug/L) at only some wells. The MCL for these two contaminants is 5 ppb. Complete VOC results can be found in the appendix.

Additional information on likely sources of these contaminants and their potential health impacts can be found on the websites of the EPA and Wisconsin DNR,

<http://www.epa.gov/safewater/contaminants/index.html>

<http://dnr.wi.gov/org/water/dwg/pubbro.htm>

**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 from seven representative locations within the distribution system. Total trihalomethane concentrations at these locations ranged from non-detectable to 5.7 ug/L. The regulatory limit corresponds to the combined sum of the four trihalomethanes named above and is 80 ug/L. Samples collected from reservoirs, ground-level storage tanks, and water towers exhibited a similar range: non-detectable to 7.6 ug/L.

Another class of disinfection by-product, the haloacetic acids (HAA5), is also tested at the seven distribution locations. Of five regulated substances, only dibromoacetic acid was detected in the distribution system. It ranged in concentration from below detection to 1.3 ug/L. The regulatory limit for the combined total of the five haloacetic acids is 60 ug/L.

**Unregulated Contaminants Monitoring Regulation, Cycle 2 (UCMR2)** – In spring 2009, the water utility completed its monitoring requirements for compliance with EPA's UCMR2 rule. Samples were collected from 22 wells and seven representative distribution system locations. Monitoring initially took place in summer/fall 2008 with repeat sampling occurring in early 2009. None of the 25 potential contaminants – including pesticides, disinfection by-products, and explosives – were detected at any location. More information on the regulation and the potential contaminants can be found at <http://www.epa.gov/safewater/ucmr/ucmr2/index.html>.

## *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 groundwater 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). Nitrate levels are stable while sodium and chloride levels are rising.

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 Madison 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.

## APPENDIX

# MADISON WATER UTILITY ROUTINE MONITORING LOCATIONS

- SAMPLING POINT ⑤
- WELL NUMBER 19
- FACILITY TYPE ACTIVE
- UNIT WELL ●
- RESERVOIR ■
- WATER TOWER ▲
- BOOSTER STATION ◆

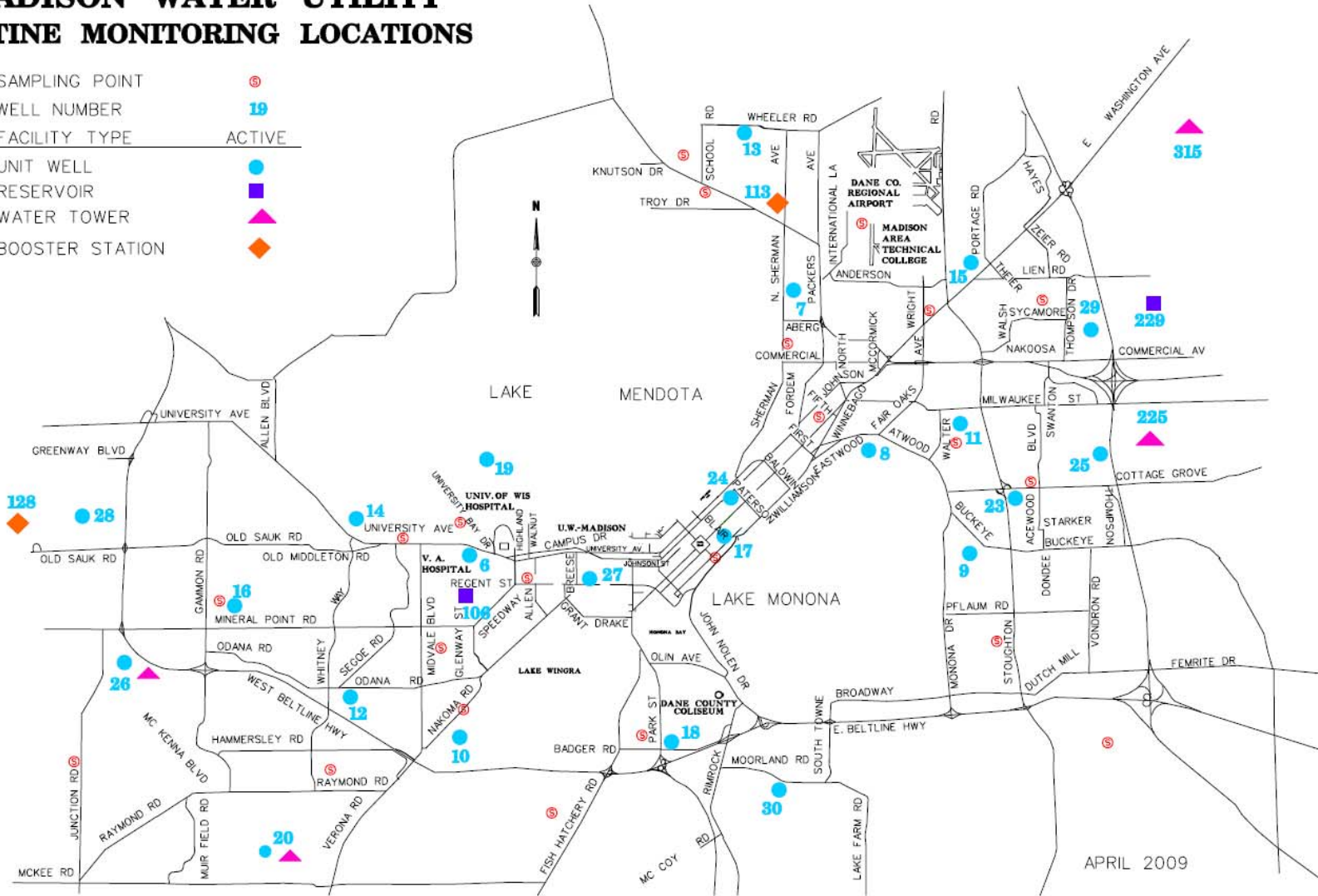


Table A-1. Annual Inorganic Test Results for Samples Collected in June and July 2009

PARAMETER	UNITS	LOD	MCL		Well #6	Well #7	Well #8	Well #9	Well #11	Well #12	Well #13	Well #14	Well #15	Well #16	Well #17
Alkalinity	(mg/l)	10.000			321	325	308	337	337	276	301	342	318	286	300
Aluminum	(ug/l)	0.20			2.0	1.4	0.49	0.77	1.2	0.55	0.72	0.80	0.88	1.5	0.78
Antimony	(ug/l)	0.20	6		<0.20	0.22	<0.20	<0.20	0.22	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	(ug/l)	0.20	10		<0.20	0.49	0.69	0.27	0.35	0.21	0.30	0.27	<0.20	0.20	0.29
Barium	(ug/l)	0.20	2000		23	37	38	27	18	17	33	50	9.2	18	28
Beryllium	(ug/l)	0.20	4		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium	(ug/l)	0.20	5		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Calcium	(mg/l)	0.021			84	78	68	80	81	62	65	100	83	74	72
Chloride	(mg/l)	1.200			38.82	15.26	21.60	33.85	51.69	2.914	8.482	91.96	47.76	39.42	50.41
Chromium	(ug/l)	0.20	100		2.5	0.44	0.82	1.2	1.2	1.7	1.1	2.2	0.90	1.5	0.40
Conductivity	umhos / cm	3.00			761	703	668	745	824	512	596	978	789	676	791
Copper	(ug/l)	0.20	1300		2.9	6.4	6.7	11	1.6	1.4	1.3	2.0	42	3.1	2.4
Fluoride	(mg/l)	0.12	4		<0.12	0.914	<0.12	0.900	1.076	1.088	1.138	1.058	0.972	0.966	1.036
Hardness Total (CaCO <sub>3</sub> )	(mg/l)	0.070			389	390	351	388	418	294	332	466	406	353	391
Iron	(mg/l)	0.0009			0.011	0.426	0.634	<0.0009	<0.0009	<0.0009	0.046	<0.0009	0.018	0.006	0.085
Lead	(ug/l)	0.20	15		0.47	0.45	<0.20	<0.20	<0.20	<0.20	<0.20	0.24	0.32	0.25	<0.20
Magnesium	(mg/l)	0.014			43	48	44	46	52	34	41	52	48	41	37
Manganese	(ug/l)	0.20			1.1	29	55	0.81	1.9	<0.20	13	0.23	4.8	<0.20	37
Mercury	(ug/l)	0.02	2		0.04	0.04	<0.02	0.04	0.10	0.04	0.06	0.05	0.05	0.04	0.02
Nickel	(ug/l)	0.20	100		1.3	0.88	0.86	0.61	1.2	0.63	0.60	0.86	1.2	0.53	0.74
Nitrogen-Nitrate	(mg/l)	0.120	10		3.391	<0.120	<0.120	1.707	2.760	1.574	<0.120	3.742	2.253	2.807	<0.120
Nitrogen-Nitrate&Nitrite	(mg/l)	0.180			3.391	<0.180	<0.180	1.707	2.760	1.574	<0.180	3.742	2.253	2.807	<0.180
Nitrogen-Nitrite	(mg/l)	0.060	1		<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Orthophosphorus	(mg/l)	0.010			0.020	<0.010	<0.010	0.016	<0.010	<0.010	<0.010	0.015	<0.010	<0.010	<0.010
pH Lab	s.u.				7.70	7.55	7.40	7.58	7.40	7.65	7.57	7.53	7.41	7.57	7.37
Selenium	(ug/l)	0.20	50		0.97	<0.20	<0.20	0.56	0.59	0.22	0.34	0.86	0.64	0.42	<0.20
Silver	(ug/l)	0.20			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Sodium	(mg/l)	0.025			12.7	7.9	11.7	14.5	18.0	2.4	5.3	32.5	18.2	15.7	20.8
Sulfate	(mg/l)	1.20			26.05	41.73	17.97	15.53	27.25	3.635	13.50	24.14	31.02	10.02	56.69
Thallium	(ug/l)	0.10	2		0.10	<0.10	0.18	<0.10	0.17	<0.10	<0.10	<0.10	0.14	<0.10	0.22
Total Solids	(mg/l)	6.00			483	435	387	450	526	288	364	675	516	417	515
Zinc	(ug/l)	0.20			13	4.0	3.3	2.7	5.3	12	1.9	4.0	2.7	15	4.7

LOD - Limit of Detection

MCL - Maximum Contaminant Level

Table A-1, continued. Annual Inorganic Test Results for Samples Collected in June and July 2009

PARAMETER	UNITS	LOD	MCL		Well #18	Well #19	Well #20	Well #23	Well #24	Well #25	Well #26	Well #27	Well #28	Well #29	Well #30
Alkalinity	(mg/l)	10.000			275	287	275	371	270	324	284	311	281	318	266
Aluminum	(ug/l)	0.20			0.5	0.6	0.45	0.77	0.78	0.81	0.58	0.56	0.59	1.1	0.75
Antimony	(ug/l)	0.20	6		0.24	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	(ug/l)	0.20	10		0.32	0.37	0.2	0.59	0.31	0.29	0.29	0.37	0.44	0.32	0.26
Barium	(ug/l)	0.20	2000		16	17	11	64	14	7.8	18	27	15.0	52	17
Beryllium	(ug/l)	0.20	4		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium	(ug/l)	0.20	5		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Calcium	(mg/l)	0.021			67	68	59	105	58	58	64	86	65	78	57
Chloride	(mg/l)	1.200			8.72	5.794	1.56	103.1	5.289	2.43	8.021	34.48	2.228	2.511	4.121
Chromium	(ug/l)	0.20	100		0.68	0.26	0.7	1.1	0.31	0.86	0.85	0.26	0.28	0.31	0.30
Conductivity	umhos / cm	3.00			558	543	503	1053	524	586	558	738	541	581	524
Copper	(ug/l)	0.20	1300		1.7	6.8	19	43	1.3	3.3	1.7	4.1	3.2	3.7	4.6
Fluoride	(mg/l)	0.12	4		0.939	1.114	1.012	0.995	1.159	1.119	1.165	1.106	1.062	<0.12	1.072
Hardness Total (CaCO <sub>3</sub> )	(mg/l)	0.070			320	314	290	489	288	322	304	399	305	349	284
Iron	(mg/l)	0.0009			<0.0009	0.195	<0.0009	0.075	0.166	0.022	0.021	0.149	0.15	0.044	0.202
Lead	(ug/l)	0.20	15		<0.20	0.54	<0.20	<0.20	<0.20	<0.20	0.22	<0.20	0.3	<0.20	<0.20
Magnesium	(mg/l)	0.014			37	35	35	55	35	43	35	45	35	37	34
Manganese	(ug/l)	0.20			6.3	37	0.88	30	33	7.8	14	34	24	24	15
Mercury	(ug/l)	0.02	2		0.11	0.04	0.03	0.08	0.08	0.12	0.05	0.03	0.02	0.04	0.03
Nickel	(ug/l)	0.20	100		1.3	1.1	0.41	2.7	0.37	0.48	1.80	3.1	1.1	1	0.43
Nitrogen-Nitrate	(mg/l)	0.120	10		0.537	<0.120	0.226	3.928	<0.120	0.575	1.262	0.374	<0.120	0.245	<0.120
Nitrogen-Nitrate&Nitrite	(mg/l)	0.180			0.537	<0.180	0.226	3.928	<0.180	0.575	1.262	0.374	<0.180	0.245	<0.180
Nitrogen-Nitrite	(mg/l)	0.060	1		<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Orthophosphorus	(mg/l)	0.010			<0.010	<0.010	<0.010	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	<0.010
pH Lab	s.u.				7.62	7.67	7.75	7.38	7.69	7.56	7.45	7.56	7.48	7.82	7.67
Selenium	(ug/l)	0.20	50		<0.20	<0.20	<0.20	1.00	<0.20	0.55	<0.20	0.33	<0.20	<0.20	<0.20
Silver	(ug/l)	0.20			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Sodium	(mg/l)	0.025			5.2	4	2.3	35.2	5.0	3.2	4.8	16.8	2.4	3.0	3.8
Sulfate	(mg/l)	1.20			16.31	7.06	8.839	33.72	13.64	6.662	12.27	41.35	21.35	4.67	17.52
Thallium	(ug/l)	0.10	2		0.13	0.14	<0.10	0.26	<0.10	<0.10	0.19	0.23	0.11	<0.10	<0.10
Total Solids	(mg/l)	6.00			333	332	295	670	320	325	329	469	351	277	304
Zinc	(ug/l)	0.20			4.5	4.1	0.87	5.8	5.3	3	9.8	8.0	9.6	2.7	6.2

LOD - Limit of Detection

MCL - Maximum Contaminant Level

Table A-2. Monthly Well Samples – Manganese Levels

Manganese Concentration, ug/L												
	January	February	March	April	May	June	July	August	September	October	November	December
Well #6	n/s	n/s	n/s	0.9	n/s	1.1	n/s	0.9	0.9	n/s	n/s	n/s
Well #7	27	27	25	27	26	29	26	27	n/s	27	n/s	n/s
Well #8	n/s	n/s	n/s	n/s	n/s	55	54	47	48	n/s	n/s	n/s
Well #9	n/s	n/s	n/s	n/s	0.9	0.8	0.7	n/s	n/s	n/s	n/s	0.6
Well #11	n/s	n/s	n/s	1.5	n/s	1.9	n/s	n/s	0.9	n/s	n/s	1.0
Well #12	n/s	n/s	n/s	n/s	n/s	<0.20	n/s	n/s	n/s	n/s	n/s	0.3
Well #13	n/s	n/s	12	n/s	n/s	13	n/s	n/s	12	n/s	n/s	12
Well #14	n/s	n/s	n/s	n/s	n/s	0.2	n/s	n/s	n/s	n/s	n/s	0.4
Well #15	n/s	n/s	6.9	n/s	n/s	4.8	n/s	n/s	6.0	n/s	n/s	12
Well #16	n/s	n/s	n/s	n/s	n/s	<0.20	n/s	n/s	n/s	n/s	n/s	< 0.15
Well #17	n/s	n/s	n/s	n/s	n/s	37	28	31	28	n/s	n/s	n/s
Well #18	n/s	n/s	1.9	0.8	n/s	6.3	n/s	n/s	n/s	n/s	n/s	7.4
Well #19	42	42	44	42	n/s	37	33	37	41	47	46	45
Well #20	n/s	n/s	n/s	n/s	0.9	0.9	1.0	n/s	n/s	n/s	n/s	0.7
Well #23	27	25	118	54	23	30	n/s	25	28	25	n/s	n/s
Well #24	31	25	27	28	23	33	24	28	29	30	29	30
Well #25	n/s	n/s	9.0	n/s	n/s	7.8	n/s	n/s	8.2	n/s	n/s	6.8
Well #26	14	23	54	57	25	14	5.8	5.6	23	11	11	11
Well #27	34	30	29	29	29	34	26	28	27	n/s	n/s	n/s
Well #28	n/s	n/s	n/s	n/s	n/s	24	20	22	21	n/s	n/s	n/s
Well #30	16	14	14	14	14	15	14	14	16	14	14	14

Table A-3. Monthly Well Samples – Iron Levels

Iron Concentration, mg/L												
	January	February	March	April	May	June	July	August	September	October	November	December
Well #6	n/s	n/s	n/s	0.008	n/s	0.011	n/s	0.007	0.007	n/s	n/s	n/s
Well #7	0.351	0.399	0.376	0.408	0.372	0.426	0.362	0.355	n/s	0.386	n/s	n/s
Well #8	n/s	n/s	n/s	n/s	n/s	0.634	0.710	0.559	0.552	n/s	n/s	n/s
Well #9	n/s	n/s	n/s	n/s	<0.0009	<0.0009	<0.00089	n/s	n/s	n/s	n/s	< 0.00089
Well #11	n/s	n/s	n/s	0.006	n/s	<0.0009	n/s	n/s	0.006	n/s	n/s	0.004
Well #12	n/s	n/s	n/s	n/s	n/s	<0.0009	n/s	n/s	n/s	n/s	n/s	0.002
Well #13	n/s	n/s	0.050	n/s	n/s	0.046	n/s	n/s	0.055	n/s	n/s	0.054
Well #14	n/s	n/s	n/s	n/s	n/s	<0.0009	n/s	n/s	n/s	n/s	n/s	< 0.00089
Well #15	n/s	n/s	0.018	n/s	n/s	0.018	n/s	n/s	0.013	n/s	n/s	0.036
Well #16	n/s	n/s	n/s	n/s	n/s	0.006	n/s	n/s	n/s	n/s	n/s	0.003
Well #17	n/s	n/s	n/s	n/s	n/s	0.085	0.088	0.095	0.106	n/s	n/s	n/s
Well #18	n/s	n/s	0.057	0.014	n/s	<0.0009	n/s	n/s	n/s	n/s	n/s	0.007
Well #19	0.199	0.204	0.221	0.196	n/s	0.195	0.187	0.204	0.208	0.214	0.209	0.196
Well #20	n/s	n/s	n/s	n/s	<0.0009	<0.0009	< 0.00089	n/s	n/s	n/s	n/s	< 0.00089
Well #23	0.060	0.072	0.457	0.158	0.057	0.075	n/s	0.067	0.086	0.063	n/s	n/s
Well #24	0.186	0.152	0.156	0.134	0.122	0.166	0.167	0.211	0.195	0.174	0.151	0.131
Well #25	n/s	n/s	0.017	n/s	n/s	0.022	n/s	n/s	0.070	n/s	n/s	0.044
Well #26	0.013	0.070	0.233	0.134	0.060	0.021	0.018	0.011	0.009	< 0.00089	0.036	0.026
Well #27	0.167	0.165	0.168	0.160	0.166	0.149	0.116	0.153	0.152	n/s	n/s	n/s
Well #28	n/s	n/s	n/s	n/s	n/s	0.150	0.169	0.190	0.186	n/s	n/s	n/s
Well #30	0.289	0.206	0.200	0.202	0.200	0.202	0.207	0.203	0.253	0.201	0.198	0.202

Table A-4. Complete radionuclide test results for samples collected at Madison wells in 2008 and 2009.

Sample Point	Sample Type	Sample Dates	Gross Alpha pCi/L	Gross Beta pCi/L	Radium-226 pCi/L	Radium-228 pCi/L	Uranium ug/L
<b>MCL</b>			<b>15</b>	<b>50</b>	<b>5*</b>	<b>5*</b>	<b>30</b>
Well #6	Composite	6/25, 8/11, 10/1, 2/27	1.6	2.2	<i>0.26<sup>#</sup></i>	<i>0.50</i>	1.2
Well #7	Grab	6/13/08	6.8	6.2	1.4	1.8	1.2
Well #8	Composite	6/26, 8/12, 10/2, 2/25	3.8	3.4	1.6	1.1	<i>0.41</i>
Well #9	Composite	6/24, 8/8, 10/10, 2/4	<i>1.9</i>	3.0	0.59	<i>0.25</i>	<i>0.46</i>
Well #10	Grab	9/10/08	2.1	1.9	<i>0.57</i>	0.78	<i>0.35</i>
Well #11	Composite	6/24, 8/8, 10/10, 2/4	<i>1.4</i>	<i>1.6</i>	<i>0.19</i>	<i>0.50</i>	<i>0.92</i>
Well #12	Composite	6/23, 8/13, 10/2, 1/20	3.0	3.5	<i>0.32</i>	<i>0.50</i>	1.4
Well #13	Composite	6/24, 8/12, 10/10, 2/5	5.4	3.2	0.64	0.82	1.2
Well #14	Composite	6/20, 8/11, 10/17, 1/20	<i>1.1</i>	2.3	<i>0.26</i>	0.86	<i>0.62</i>
Well #15	Composite	6/24, 8/8, 10/10, 2/5	4.8	3.3	0.56	3.8	1.5
Well #16	Composite	6/20, 8/11, 10/22, 2/20	2.8	1.4	<i>0.06</i>	<i>0.31</i>	1.5
Well #17	Composite	6/27, 8/12, 10/2, 2/27	3.5	2.6	0.70	0.75	<i>0.55</i>
Well #18	Composite	6/20, 8/13, 10/22, 3/25	<i>1.6</i>	2.6	0.85	0.84	<i>0.61</i>
Well #19	Grab	6/13/08	10.3	10.7	1.4	2.1	2.0
Well #20	Composite	6/23, 8/11, 10/2, 1/20	<i>2.0</i>	2.1	<i>0.37</i>	<i>0.54</i>	<i>0.65</i>
Well #23	Grab	6/13/08	4.7	5.8	0.60	1.0	<i>0.94</i>
Well #24	Composite	6/24, 8/12, 10/10, 1/20	4.5	5.5	1.0	0.98	<i>0.44</i>
Well #25	Composite	6/24, 8/8, 10/10, 2/4	5.5	3.6	1.1	0.87	<i>0.83</i>
Well #26	Composite	7/8, 10/2, 1/20, 4/1	3.1	7.8	<i>0.47</i>	1.2	<i>0.91</i>
Well #27	Grab	6/13/08	9.5	6.9	2.7	2.2	1.5
Well #28	Grab	6/13/08	9.7	11.8	2.3	1.5	<i>0.80</i>
Well #29	Grab	9/9/08	2.2	2.6	1.1	0.87	<i>0.29</i>
Well #30	Composite	6/20, 8/13, 10/17, 2/4	6.6	4.8	1.1	1.4	<i>0.71</i>

MCL - Maximum Contaminant Level  
 LOQ - Limit of Quantification

\* MCL for combined radium (226+228) is 5 pCi/L  
<sup>#</sup> Italicized numbers are below the LOQ

Table A-5. Volatile Organic Compound Test Results for Water Utility Facilities

VOLATILE ORGANIC COMPOUND	UNITS	MCL <sup>2</sup>	MCLG <sup>3</sup>	Well	6	7	8	8	9	9	9	9	11	11	11	11	12
				Date	7/13	7/14	7/13	8/11	2/4	4/20	7/14	10/6	2/4	4/20	7/14	10/6	7/13
Benzene	ug/L	5	0		<0.24	<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.24	<0.24
Bromobenzene	ug/L	--	--		<0.14	<0.14	<0.14	<0.14	<0.23	<0.14	<0.14	<0.14	<0.23	<0.14	<0.14	<0.14	<0.14
<b>Bromodichloromethane*</b>	ug/L	80	0		<0.21	<b>[0.37]</b>	<b>2.3</b>	<b>[0.61]</b>	<b>[0.41]</b>	<b>[0.44]</b>	<b>[0.41]</b>	<b>[0.51]</b>	<0.20	<0.21	<0.21	<0.21	<0.21
<b>Bromoform*</b>	ug/L	80	0		<0.14	<0.14	<b>[0.41]</b>	<0.14	<b>[0.44]</b>	<b>0.49</b>	<b>[0.42]</b>	<b>0.49</b>	<b>[0.20]</b>	<b>[0.32]</b>	<b>[0.21]</b>	<b>[0.23]</b>	<0.14
Bromomethane	ug/L	--	--		<0.26	<0.26	<0.26	<0.26	<0.28	<0.26	<0.26	<0.26	<0.28	<0.26	<0.26	<0.26	<0.26
Carbon Tetrachloride	ug/L	5	0		<0.27	<0.27	<0.27	<0.27	<0.14	<0.27	<0.27	<0.27	<0.14	<0.27	<0.27	<0.27	<0.27
Chloroethane	ug/L	--	--		<0.95	<0.95	<0.95	<0.95	<0.79	<0.95	<0.95	<0.95	<0.79	<0.95	<0.95	<0.95	<0.95
<b>Chloroform*</b>	ug/L	80	--		<b>[0.17]</b>	<b>[0.31]</b>	<b>35</b>	<b>1.4</b>	<0.20	<b>[0.15]</b>	<b>[0.15]</b>	<b>[0.19]</b>	<0.20	<b>[0.16]</b>	<0.12	<0.12	<0.12
Chloromethane (Methyl Chloride)	ug/L	--	--		<0.16	<0.16	<0.16	<0.16	<0.31	<0.16	<0.16	<0.16	<0.31	<0.16	<0.16	<0.16	<0.16
o-Chlorotoluene	ug/L	--	--		<0.15	<0.15	<0.15	<0.15	<0.21	<0.15	<0.15	<0.15	<0.21	<0.15	<0.15	<0.15	<0.15
p-Chlorotoluene	ug/L	--	--		<0.13	<0.13	<0.13	<0.13	<0.17	<0.13	<0.13	<0.13	<0.17	<0.13	<0.13	<0.13	<0.13
<b>Dibromochloromethane*</b>	ug/L	80	60		<0.16	<b>[0.23]</b>	<b>1.3</b>	<b>[0.35]</b>	<b>[0.78]</b>	<b>0.82</b>	<b>0.73</b>	<b>0.80</b>	<0.23	<b>[0.31]</b>	<b>[0.22]</b>	<b>[0.22]</b>	<0.16
Dibromomethane	ug/L	--	--		<0.13	<0.13	<0.13	<0.13	<0.21	<0.13	<0.13	<0.13	<0.21	<0.13	<0.13	<0.13	<0.13
m-Dichlorobenzene (1,3)	ug/L	--	--		<0.17	<0.17	<0.17	<0.17	<0.22	<0.17	<0.17	<0.17	<0.22	<0.17	<0.17	<0.17	<0.17
o-Dichlorobenzene (1,2)	ug/L	600	600		<0.15	<0.15	<0.15	<0.15	<0.19	<0.15	<0.15	<0.15	<0.19	<0.15	<0.15	<0.15	<0.15
p-Dichlorobenzene (1,4)	ug/L	75	75		<0.17	<0.17	<0.17	<0.17	<0.19	<0.17	<0.17	<0.17	<0.19	<0.17	<0.17	<0.17	<0.17
<b>Dichlorodifluoromethane</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.16	n/r	n/r	n/r	<0.16	n/r
1,1-Dichloroethane	ug/L	--	--		<0.25	<0.25	<0.25	<0.25	<0.21	<0.25	<0.25	<0.25	<0.21	<0.25	<0.25	<0.25	<0.25
<b>1,2-Dichloroethane</b>	ug/L	5	0		<0.15	<0.15	<0.15	<0.15	<0.23	<0.15	<0.15	<0.15	<0.23	<0.15	<0.15	<0.15	<0.15
1,1-Dichloroethylene	ug/L	7	7		<0.18	<0.18	<0.18	<0.18	<0.13	<0.18	<0.18	<0.18	<0.13	<0.18	<0.18	<0.18	<0.18
<b>1,2-Dichloroethylene (cis)</b>	ug/L	70	70		<0.10	<0.10	<b>[0.18]</b>	<b>[0.17]</b>	<0.20	<0.10	<0.10	<b>[0.13]</b>	<b>[0.34]</b>	<b>[0.30]</b>	<b>0.40</b>	<b>0.38</b>	<0.10
1,2-Dichloroethylene (trans)	ug/L	100	100		<0.28	<0.28	<0.28	<0.28	<0.19	<0.28	<0.28	<0.28	<0.19	<0.28	<0.28	<0.28	<0.28
Dichloromethane	ug/L	5	0		<0.25	<0.25	<0.25	<0.25	<0.40	<0.25	<0.25	<0.25	<0.40	<0.25	<0.25	<0.25	<0.25
1,2-Dichloropropane	ug/L	5	0		<0.22	<0.22	<0.22	<0.22	<0.23	<0.22	<0.22	<0.22	<0.23	<0.22	<0.22	<0.22	<0.22
1,3-Dichloropropane	ug/L	--	--		<0.14	<0.14	<0.14	<0.14	<0.28	<0.14	<0.14	<0.14	<0.28	<0.14	<0.14	<0.14	<0.14
2,2-Dichloropropane	ug/L	--	--		<0.17	<0.17	<0.17	<0.17	<0.37	<0.17	<0.17	<0.17	<0.37	<0.17	<0.17	<0.17	<0.17
1,1-Dichloropropene	ug/L	--	--		<0.11	<0.11	<0.11	<0.11	<0.12	<0.11	<0.11	<0.11	<0.12	<0.11	<0.11	<0.11	<0.11
1,3-Dichloropropene	ug/L	--	--		<0.33	<0.33	<0.33	<0.33	<0.41	<0.33	<0.33	<0.33	<0.41	<0.33	<0.33	<0.33	<0.33
Ethylbenzene	ug/L	700	700		<0.24	<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.24	<0.24
Hexachlorobutadiene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.18	n/r	n/r	n/r	<0.18	n/r
Isopropylbenzene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.14	n/r	n/r	n/r	<0.14	n/r
p-Isopropyltoluene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.20	n/r	n/r	n/r	<0.20	n/r
<b>Methyl t-butyl ether</b>	ug/L	--	--		<0.13	<0.13	<0.13	<0.13	<0.27	<0.13	<0.13	<0.13	<0.27	<0.13	<0.13	<0.13	<0.13
Monochlorobenzene	ug/L	100	100		<0.11	<0.11	<0.11	<0.11	<0.21	<0.11	<0.11	<0.11	<0.21	<0.11	<0.11	<0.11	<0.11
Naphthalene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.23	n/r	n/r	<0.23	n/r	n/r
Styrene	ug/L	100	100		<0.11	<0.11	<0.11	<0.11	<0.15	<0.11	<0.11	<0.11	<0.15	<0.11	<0.11	<0.11	<0.11
1,1,1,2-Tetrachloroethane	ug/L	--	--		<0.12	<0.12	<0.12	<0.12	<0.22	<0.12	<0.12	<0.12	<0.22	<0.12	<0.12	<0.12	<0.12
1,1,2,2-Tetrachloroethane	ug/L	--	--		<0.19	<0.19	<0.19	<0.19	<0.23	<0.19	<0.19	<0.19	<0.23	<0.19	<0.19	<0.19	<0.19
<b>Tetrachloroethylene</b>	ug/L	5	0		<b>[0.49]</b>	<0.20	<0.20	<0.20	<b>2.0</b>	<b>2.1</b>	<b>2.0</b>	<b>2.2</b>	<b>0.57</b>	<b>[0.54]</b>	<b>[0.75]</b>	<b>[0.64]</b>	<0.20
<b>Toluene</b>	ug/L	1000	1000		<0.12	<0.12	<0.12	<0.12	<0.18	<0.12	<0.12	<0.12	<0.18	<0.12	<0.12	<0.12	<0.12
1,2,4-Trichlorobenzene	ug/L	70	70		<0.20	<0.20	<0.20	<0.20	<0.21	<0.20	<0.20	<0.20	<0.21	<0.20	<0.20	<0.20	<0.20
<b>1,1,1-Trichloroethane</b>	ug/L	200	200		<0.10	<0.10	<0.10	<0.10	<0.15	<b>[0.11]</b>	<b>[0.11]</b>	<b>[0.15]</b>	<0.15	<0.10	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	ug/L	5	3		<0.13	<0.13	<0.13	<0.13	<0.26	<0.13	<0.13	<0.13	<0.26	<0.13	<0.13	<0.13	<0.13
<b>Trichloroethylene</b>	ug/L	5	0		<0.25	<0.25	<0.25	<0.25	<0.18	<0.25	<0.25	<0.25	<b>[0.27]</b>	<b>[0.27]</b>	<b>[0.35]</b>	<b>[0.30]</b>	<0.25
<b>Trichlorofluoromethane</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.16	<b>1.00</b>	<b>1.10</b>	<b>1.30</b>	<b>1.3</b>	n/r
1,2,3-Trichloropropane	ug/L	--	--		<0.35	<0.35	<0.35	<0.35	<0.21	<0.35	<0.35	<0.35	<0.21	<0.35	<0.35	<0.35	<0.35
Trichlorotrifluoroethane	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.18	n/r	n/r	n/r	<0.18	n/r
<b>1,2,4-Trimethylbenzene</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.15	n/r	n/r	n/r	<0.15	n/r
<b>1,3,5-Trimethylbenzene</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	n/r	n/r	<0.14	n/r	n/r	n/r	<0.14	n/r
Vinyl Chloride	ug/L	0.2	0		<0.19	<0.19	<0.19	<0.19	<0.11	<0.19	<0.19	<0.19	<0.11	<0.19	<0.19	<0.19	<0.19
Xylene, Total	ug/L	10000	10000		<0.63	<0.63	<0.63	<0.63	<0.55	<0.63	<0.63	<0.63	<0.55	<0.63	<0.63	<0.63	<0.63
<b>Total Trihalomethanes (TTHM)</b>	ug/L	80	--		<b>0.17</b>	<b>0.91</b>	<b>39</b>	<b>2.4</b>	<b>1.6</b>	<b>1.9</b>	<b>1.7</b>	<b>2.0</b>	<b>0.20</b>	<b>0.79</b>	<b>0.43</b>	<b>0.45</b>	ND

\* Disinfection By-Products

n/r = Not Reported

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

Shading/bold type is used for ease of identifying detections

Table A-5, Continued. Volatile Organic Compound Test Results for Water Utility Facilities

VOLATILE ORGANIC COMPOUND	UNITS	MCL <sup>2</sup>	MCLG <sup>3</sup>	Well	13	14	14	14	14	15	15	15	15	15	16	17
				Date	8/4	2/4	4/20	7/13	10/20	2/3	4/20	7/14	8/4	10/7	7/13	7/13
Benzene	ug/L	5	0		<0.24	<0.15	<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24
Bromobenzene	ug/L	--	--		<0.14	<0.23	<0.14	<0.14	<0.14	<0.23	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
<b>Bromodichloromethane*</b>	ug/L	80	0		<0.21	<0.20	<0.21	<0.21	<0.21	<0.20	<b>[0.39]</b>	<0.21	<0.21	<b>[0.25]</b>	<0.21	<b>1.1</b>
<b>Bromoform*</b>	ug/L	80	0		<0.14	<b>[0.28]</b>	<b>[0.42]</b>	<b>[0.25]</b>	<b>[0.20]</b>	<b>[0.22]</b>	<b>0.94</b>	<0.14	<b>[0.16]</b>	<b>[0.45]</b>	<b>[0.16]</b>	<b>[0.35]</b>
Bromomethane	ug/L	--	--		<0.26	<0.28	<0.26	<0.26	<0.26	<0.28	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Carbon Tetrachloride	ug/L	5	0		<0.27	<0.14	<0.27	<0.27	<0.27	<0.14	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
Chloroethane	ug/L	--	--		<0.95	<0.79	<0.95	<0.95	<0.95	<0.79	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95
<b>Chloroform*</b>	ug/L	80	--		<0.12	<0.20	<0.12	<0.12	<0.12	<0.20	<0.12	<0.12	<0.12	<b>[0.16]</b>	<0.12	<b>0.76</b>
Chloromethane (Methyl Chloride)	ug/L	--	--		<0.16	<0.31	<0.16	<0.16	<0.16	<0.31	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
o-Chlorotoluene	ug/L	--	--		<0.15	<0.21	<0.15	<0.15	<0.15	<0.21	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
p-Chlorotoluene	ug/L	--	--		<0.13	<0.17	<0.13	<0.13	<0.13	<0.17	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
<b>Dibromochloromethane*</b>	ug/L	80	60		<0.16	<0.23	<b>[0.30]</b>	<b>[0.19]</b>	<b>[0.16]</b>	<0.23	<b>1.0</b>	<0.16	<b>[0.16]</b>	<b>0.57</b>	<0.16	<b>1.1</b>
Dibromomethane	ug/L	--	--		<0.13	<0.21	<0.13	<0.13	<0.13	<0.21	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
m-Dichlorobenzene (1,3)	ug/L	--	--		<0.17	<0.22	<0.17	<0.17	<0.17	<0.22	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
o-Dichlorobenzene (1,2)	ug/L	600	600		<0.15	<0.19	<0.15	<0.15	<0.15	<0.19	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
p-Dichlorobenzene (1,4)	ug/L	75	75		<0.17	<0.19	<0.17	<0.17	<0.17	<0.19	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
<b>Dichlorodifluoromethane</b>	ug/L	--	--		n/r	<b>[0.18]</b>	<b>[0.23]</b>	<b>[0.21]</b>	<b>[0.19]</b>	n/r	n/r	n/r	n/r	<0.16	n/r	n/r
1,1-Dichloroethane	ug/L	--	--		<0.25	<0.21	<0.25	<0.25	<0.25	<0.21	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
<b>1,2-Dichloroethane</b>	ug/L	5	0		<0.15	<0.23	<0.15	<0.15	<0.15	<0.23	<0.15	<0.15	<0.15	<0.15	<0.15	<b>[0.17]</b>
1,1-Dichloroethylene	ug/L	7	7		<0.18	<0.13	<0.18	<0.18	<0.18	<0.13	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
<b>1,2-Dichloroethylene (cis)</b>	ug/L	70	70		<0.10	<0.20	<b>[0.11]</b>	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichloroethylene (trans)	ug/L	100	100		<0.28	<0.19	<0.28	<0.28	<0.28	<0.19	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28
Dichloromethane	ug/L	5	0		<0.25	<0.40	<0.25	<0.25	<0.25	<0.40	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,2-Dichloropropane	ug/L	5	0		<0.22	<0.23	<0.22	<0.22	<0.22	<0.23	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
1,3-Dichloropropane	ug/L	--	--		<0.14	<0.28	<0.14	<0.14	<0.14	<0.28	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
2,2-Dichloropropane	ug/L	--	--		<0.17	<0.37	<0.17	<0.17	<0.17	<0.37	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
1,1-Dichloropropene	ug/L	--	--		<0.11	<0.12	<0.11	<0.11	<0.11	<0.12	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
1,3-Dichloropropene	ug/L	--	--		<0.33	<0.41	<0.33	<0.33	<0.33	<0.41	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Ethylbenzene	ug/L	700	700		<0.24	<0.15	<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24
Hexachlorobutadiene	ug/L	--	--		n/r	n/r	n/r	n/r	<0.18	n/r	n/r	n/r	n/r	<0.18	n/r	n/r
Isopropylbenzene	ug/L	--	--		n/r	n/r	n/r	n/r	<0.14	n/r	n/r	n/r	n/r	<0.14	n/r	n/r
p-Isopropyltoluene	ug/L	--	--		n/r	n/r	n/r	n/r	<0.20	n/r	n/r	n/r	n/r	<0.20	n/r	n/r
<b>Methyl t-butyl ether</b>	ug/L	--	--		<0.13	<0.27	<0.13	<0.13	<0.13	<0.27	<b>[0.14]</b>	<b>[0.13]</b>	<0.13	<0.13	<0.13	<0.13
Monochlorobenzene	ug/L	100	100		<0.11	<0.21	<0.11	<0.11	<0.11	<0.21	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Naphthalene	ug/L	--	--		n/r	n/r	n/r	n/r	<0.23	n/r	n/r	n/r	n/r	<0.23	n/r	n/r
Styrene	ug/L	100	100		<0.11	<0.15	<0.11	<0.11	<0.11	<0.15	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
1,1,1,2-Tetrachloroethane	ug/L	--	--		<0.12	<0.22	<0.12	<0.12	<0.12	<0.22	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
1,1,1,2-Tetrachloroethane	ug/L	--	--		<0.19	<0.23	<0.19	<0.19	<0.19	<0.23	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
<b>Tetrachloroethylene</b>	ug/L	5	0		<0.20	<b>0.72</b>	<b>[0.76]</b>	<b>[0.68]</b>	<b>[0.68]</b>	<b>3.6</b>	<b>3.6</b>	<b>3.9</b>	<b>3.8</b>	<b>3.4</b>	<0.20	<0.20
<b>Toluene</b>	ug/L	1000	1000		<0.12	<0.18	<0.12	<0.12	<0.12	<0.18	<0.12	<b>[0.37]</b>	<0.12	<0.12	<0.12	<0.12
1,2,4-Trichlorobenzene	ug/L	70	70		<0.20	<0.21	<0.20	<0.20	<0.20	<0.21	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
<b>1,1,1-Trichloroethane</b>	ug/L	200	200		<0.10	<0.15	<0.10	<0.10	<0.10	<0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	ug/L	5	3		<0.13	<0.26	<0.13	<0.13	<0.13	<0.26	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
<b>Trichloroethylene</b>	ug/L	5	0		<0.25	<b>[0.32]</b>	<b>[0.37]</b>	<b>[0.32]</b>	<b>[0.31]</b>	<b>[0.37]</b>	<b>[0.35]</b>	<b>[0.40]</b>	<b>[0.39]</b>	<b>[0.35]</b>	<0.25	<0.25
<b>Trichlorofluoromethane</b>	ug/L	--	--		n/r	n/r	n/r	n/r	<0.16	n/r	n/r	n/r	n/r	<0.16	n/r	n/r
1,2,3-Trichloropropane	ug/L	--	--		<0.35	<0.21	<0.35	<0.35	<0.35	<0.21	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
Trichlorotrifluoroethane	ug/L	--	--		n/r	n/r	n/r	n/r	<0.18	n/r	n/r	n/r	n/r	<0.18	n/r	n/r
<b>1,2,4-Trimethylbenzene</b>	ug/L	--	--		n/r	n/r	n/r	n/r	<0.15	n/r	n/r	<b>[0.38]</b>	n/r	<0.15	n/r	n/r
<b>1,3,5-Trimethylbenzene</b>	ug/L	--	--		n/r	n/r	n/r	n/r	<0.14	n/r	n/r	<b>[0.20]</b>	n/r	<0.14	n/r	n/r
Vinyl Chloride	ug/L	0.2	0		<0.19	<0.11	<0.19	<0.19	<0.19	<0.11	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
Xylene, Total	ug/L	10000	10000		<0.63	<0.55	<0.63	<0.63	<0.63	<0.55	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63
<b>Total Trihalomethanes (TTHM)</b>	ug/L	80	--		ND	<b>0.28</b>	<b>0.72</b>	<b>0.44</b>	<b>0.36</b>	<b>0.22</b>	<b>2.3</b>	ND	<b>0.32</b>	<b>1.4</b>	<b>0.16</b>	<b>3.3</b>

\* Disinfection By-Products

n/r = Not Reported

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

Shading/bold type is used for ease of identifying detections

Table A-5, Continued. Volatile Organic Compound Test Results for Water Utility Facilities

VOLATILE ORGANIC COMPOUND	UNITS	MCL <sup>2</sup>	MCLG <sup>3</sup>	Well	18	18	18	18	19	20	23	24	25	26	27	27
				Date	3/25	4/21	7/14	10/20	7/13	7/13	8/11	7/13	7/14	7/13	2/4	8/4
Benzene	ug/L	5	0		<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.15	<0.24
Bromobenzene	ug/L	--	--		<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.23	<0.14
<b>Bromodichloromethane*</b>	ug/L	80	0		<0.21	<b>[0.30]</b>	<0.21	<0.21	<b>2.4</b>	<0.21	<0.21	<b>1.2</b>	<0.21	<b>[0.32]</b>	<0.20	<0.21
<b>Bromoform*</b>	ug/L	80	0		<b>[0.19]</b>	<b>0.52</b>	<0.14	<0.14	<0.14	<0.14	<b>[0.33]</b>	<b>[0.32]</b>	<0.14	<0.14	<0.19	<0.14
Bromomethane	ug/L	--	--		<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.28	<0.26
Carbon Tetrachloride	ug/L	5	0		<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.14	<0.27
Chloroethane	ug/L	--	--		<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.79	<0.95
<b>Chloroform*</b>	ug/L	80	--		<b>0.66</b>	<b>[0.36]</b>	<0.12	<0.12	<b>3.4</b>	<b>[0.12]</b>	<b>[0.17]</b>	<b>0.65</b>	<0.12	<b>[0.19]</b>	<0.20	<0.12
Chloromethane (Methyl Chloride)	ug/L	--	--		<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.31	<0.16
o-Chlorotoluene	ug/L	--	--		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.21	<0.15
p-Chlorotoluene	ug/L	--	--		<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.17	<0.13
<b>Dibromochloromethane*</b>	ug/L	80	60		<0.16	<b>0.63</b>	<b>[0.20]</b>	<0.16	<b>1.2</b>	<b>[0.20]</b>	<b>0.53</b>	<b>1.4</b>	<0.16	<b>[0.36]</b>	<0.23	<b>[0.16]</b>
Dibromomethane	ug/L	--	--		<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.21	<0.13
m-Dichlorobenzene (1,3)	ug/L	--	--		<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.22	<0.17
o-Dichlorobenzene (1,2)	ug/L	600	600		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.19	<0.15
p-Dichlorobenzene (1,4)	ug/L	75	75		<0.16	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.19	<0.17
<b>Dichlorodifluoromethane</b>	ug/L	--	--		n/r	n/r	n/r	<0.16	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
1,1-Dichloroethane	ug/L	--	--		<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.21	<0.25
<b>1,2-Dichloroethane</b>	ug/L	5	0		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.23	<0.15
1,1-Dichloroethylene	ug/L	7	7		<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.13	<0.18
<b>1,2-Dichloroethylene (cis)</b>	ug/L	70	70		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10
1,2-Dichloroethylene (trans)	ug/L	100	100		<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.19	<0.28
Dichloromethane	ug/L	5	0		<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.40	<0.25
1,2-Dichloropropane	ug/L	5	0		<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.23	<0.22
1,3-Dichloropropane	ug/L	--	--		<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.28	<0.14
2,2-Dichloropropane	ug/L	--	--		<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.37	<0.17
1,1-Dichloropropene	ug/L	--	--		<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.12	<0.11
1,3-Dichloropropene	ug/L	--	--		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.41	<0.33
Ethylbenzene	ug/L	700	700		<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.15	<0.24
Hexachlorobutadiene	ug/L	--	--		<0.18	n/r	n/r	<0.18	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Isopropylbenzene	ug/L	--	--		<0.14	n/r	n/r	<0.14	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
p-Isopropyltoluene	ug/L	--	--		<0.20	n/r	n/r	<0.20	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
<b>Methyl t-butyl ether</b>	ug/L	--	--		<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.27	<0.13
Monochlorobenzene	ug/L	100	100		n/r	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.21	<0.11
Naphthalene	ug/L	--	--		<0.23	n/r	n/r	<0.23	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Styrene	ug/L	100	100		<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.15	<0.11
1,1,1,2-Tetrachloroethane	ug/L	--	--		<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.22	<0.12
1,1,1,2-Tetrachloroethane	ug/L	--	--		<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.23	<0.19
<b>Tetrachloroethylene</b>	ug/L	5	0		<b>3.5</b>	<b>3.3</b>	<b>1.3</b>	<b>0.93</b>	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<b>[0.31]</b>	<b>[0.24]</b>
<b>Toluene</b>	ug/L	1000	1000		<b>2.2</b>	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.18	<0.12
1,2,4-Trichlorobenzene	ug/L	70	70		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.21	<0.20
<b>1,1,1-Trichloroethane</b>	ug/L	200	200		<b>[0.29]</b>	<b>[0.28]</b>	<b>[0.11]</b>	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.15	<0.10
1,1,2-Trichloroethane	ug/L	5	3		<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.26	<0.13
<b>Trichloroethylene</b>	ug/L	5	0		<b>[0.40]</b>	<b>[0.36]</b>	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.18	<0.25
<b>Trichlorofluoromethane</b>	ug/L	--	--		<0.16	n/r	n/r	<0.16	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
1,2,3-Trichloropropane	ug/L	--	--		<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.21	<0.35
Trichlorotrifluoroethane	ug/L	--	--		<0.18	n/r	n/r	<0.18	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
<b>1,2,4-Trimethylbenzene</b>	ug/L	--	--		<0.15	n/r	n/r	<0.15	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
<b>1,3,5-Trimethylbenzene</b>	ug/L	--	--		<0.14	n/r	n/r	<0.14	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Vinyl Chloride	ug/L	0.2	0		<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.11	<0.19
Xylene, Total	ug/L	10000	10000		<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.55	<0.63
<b>Total Trihalomethanes (TTHM)</b>	ug/L	80	--		<b>0.85</b>	<b>1.8</b>	<b>0.20</b>	ND	<b>7.0</b>	<b>0.32</b>	<b>1.0</b>	<b>3.6</b>	ND	<b>0.87</b>	ND	<b>0.16</b>

\* Disinfection By-Products

n/r = Not Reported

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

Shading/bold type is used for ease of identifying detections

Table A-5, Continued. Volatile Organic Compound Test Results for Water Utility Facilities

VOLATILE ORGANIC COMPOUND	UNITS	MCL <sup>2</sup>	MCLG <sup>3</sup>	Well Date	28	29	30	106	106	106	315	315	315	229	229
					7/13	7/14	7/14	2/4	7/13	10/20	2/3	8/4	10/7	2/3	8/4
Benzene	ug/L	5	0		<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.15	<0.24	<0.24	<0.15	<0.24
Bromobenzene	ug/L	--	--		<0.14	<0.14	<0.14	<0.23	<0.14	<0.14	<0.23	<0.14	<0.14	<0.23	<0.14
<b>Bromodichloromethane*</b>	ug/L	80	0		<0.21	<b>[0.25]</b>	<0.21	<b>1.6</b>	<b>&lt;0.21</b>	<b>1.6</b>	<b>[0.50]</b>	<b>1.1</b>	<b>2.0</b>	<b>0.94</b>	<b>2.7</b>
<b>Bromoform*</b>	ug/L	80	0		<0.14	<0.14	<0.14	<b>2.0</b>	<b>[0.44]</b>	<b>2.1</b>	<b>0.76</b>	<b>1.5</b>	<b>[0.44]</b>	<b>[0.53]</b>	<b>[0.30]</b>
Bromomethane	ug/L	--	--		<0.26	<0.26	<0.26	<0.28	<0.26	<0.26	<0.28	<0.26	<0.26	<0.28	<0.26
Carbon Tetrachloride	ug/L	5	0		<0.27	<0.27	<0.27	<0.14	<0.27	<0.27	<0.14	<0.27	<0.27	<0.14	<0.27
Chloroethane	ug/L	--	--		<0.95	<0.95	<0.95	<0.79	<0.95	<0.95	<0.79	<0.95	<0.95	<0.79	<0.95
<b>Chloroform*</b>	ug/L	80	--		<0.12	<b>0.49</b>	<0.12	<b>0.99</b>	<b>[0.12]</b>	<b>0.89</b>	<b>[0.20]</b>	<b>0.48</b>	<b>1.7</b>	<b>[0.49]</b>	<b>2.9</b>
Chloromethane (Methyl Chloride)	ug/L	--	--		<0.16	<0.16	<0.16	<0.31	<0.16	<0.16	<0.31	<0.16	<0.16	<0.31	<0.16
o-Chlorotoluene	ug/L	--	--		<0.15	<0.15	<0.15	<0.21	<0.15	<0.15	<0.21	<0.15	<0.15	<0.21	<0.15
p-Chlorotoluene	ug/L	--	--		<0.13	<0.13	<0.13	<0.17	<0.13	<0.13	<0.17	<0.13	<0.13	<0.17	<0.13
<b>Dibromochloromethane*</b>	ug/L	80	60		<0.16	<0.16	<0.16	<b>2.6</b>	<b>[0.41]</b>	<b>2.6</b>	<b>0.96</b>	<b>1.9</b>	<b>1.5</b>	<b>1.3</b>	<b>1.7</b>
Dibromomethane	ug/L	--	--		<0.13	<0.13	<0.13	<0.21	<0.13	<0.13	<0.21	<0.13	<0.13	<0.21	<0.13
m-Dichlorobenzene (1,3)	ug/L	--	--		<0.17	<0.17	<0.17	<0.22	<0.17	<0.17	<0.22	<0.17	<0.17	<0.22	<0.17
o-Dichlorobenzene (1,2)	ug/L	600	600		<0.15	<0.15	<0.15	<0.19	<0.15	<0.15	<0.19	<0.15	<0.15	<0.19	<0.15
p-Dichlorobenzene (1,4)	ug/L	75	75		<0.17	<0.17	<0.17	<0.19	<0.17	<0.17	<0.19	<0.17	<0.17	<0.19	<0.17
<b>Dichlorodifluoromethane</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.16	n/r	n/r	<0.16	n/r	n/r
1,1-Dichloroethane	ug/L	--	--		<0.25	<0.25	<0.25	<0.21	<0.25	<0.25	<0.21	<0.25	<0.25	<0.21	<0.25
<b>1,2-Dichloroethane</b>	ug/L	5	0		<0.15	<0.15	<0.15	<0.23	<0.15	<0.15	<0.23	<0.15	<0.15	<0.23	<0.15
1,1-Dichloroethylene	ug/L	7	7		<0.18	<0.18	<0.18	<0.13	<0.18	<0.18	<0.13	<0.18	<0.18	<0.13	<0.18
<b>1,2-Dichloroethylene (cis)</b>	ug/L	70	70		<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10
1,2-Dichloroethylene (trans)	ug/L	100	100		<0.28	<0.28	<0.28	<0.19	<0.28	<0.28	<0.19	<0.28	<0.28	<0.19	<0.28
Dichloromethane	ug/L	5	0		<0.25	<0.25	<0.25	<0.40	<0.25	<0.25	<0.40	<0.25	<0.25	<0.40	<0.25
1,2-Dichloropropane	ug/L	5	0		<0.22	<0.22	<0.22	<0.23	<0.22	<0.22	<0.23	<0.22	<0.22	<0.23	<0.22
1,3-Dichloropropane	ug/L	--	--		<0.14	<0.14	<0.14	<0.28	<0.14	<0.14	<0.28	<0.14	<0.14	<0.28	<0.14
2,2-Dichloropropane	ug/L	--	--		<0.17	<0.17	<0.17	<0.37	<0.17	<0.17	<0.37	<0.17	<0.17	<0.37	<0.17
1,1-Dichloropropene	ug/L	--	--		<0.11	<0.11	<0.11	<0.12	<0.11	<0.11	<0.12	<0.11	<0.11	<0.12	<0.11
1,3-Dichloropropene	ug/L	--	--		<0.33	<0.33	<0.33	<0.41	<0.33	<0.33	<0.41	<0.33	<0.33	<0.41	<0.33
Ethylbenzene	ug/L	700	700		<0.24	<0.24	<0.24	<0.15	<0.24	<0.24	<0.15	<0.24	<0.24	<0.15	<0.24
Hexachlorobutadiene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.18	n/r	n/r	<0.18	n/r	n/r
Isopropylbenzene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.14	n/r	n/r	<0.14	n/r	n/r
p-Isopropyltoluene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.20	n/r	n/r	<0.20	n/r	n/r
<b>Methyl t-butyl ether</b>	ug/L	--	--		<0.13	<0.13	<0.13	<0.27	<0.13	<0.13	<0.27	<0.13	<0.13	<0.27	<0.13
Monochlorobenzene	ug/L	100	100		<0.11	<0.11	<0.11	<0.21	<0.11	<0.11	<0.21	<0.11	<0.11	<0.21	<0.11
Naphthalene	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.23	n/r	n/r	<0.23	n/r	n/r
Styrene	ug/L	100	100		<0.11	<0.11	<0.11	<0.15	<0.11	<0.11	<0.15	<0.11	<0.11	<0.15	<0.11
1,1,1,2-Tetrachloroethane	ug/L	--	--		<0.12	<0.12	<0.12	<0.22	<0.12	<0.12	<0.22	<0.12	<0.12	<0.22	<0.12
1,1,2,2-Tetrachloroethane	ug/L	--	--		<0.19	<0.19	<0.19	<0.23	<0.19	<0.19	<0.23	<0.19	<0.19	<0.23	<0.19
<b>Tetrachloroethylene</b>	ug/L	5	0		<0.20	<0.20	<0.20	<b>[0.45]</b>	<b>[0.36]</b>	<b>[0.47]</b>	<b>1.8</b>	<b>1.4</b>	<0.20	<0.15	<0.20
<b>Toluene</b>	ug/L	1000	1000		<0.12	<0.12	<0.12	<0.18	<0.12	<0.12	<0.18	<0.12	<0.12	<0.18	<0.12
1,2,4-Trichlorobenzene	ug/L	70	70		<0.20	<0.20	<0.20	<0.21	<0.20	<0.20	<0.21	<0.20	<0.20	<0.21	<0.20
<b>1,1,1-Trichloroethane</b>	ug/L	200	200		<0.10	<0.10	<0.10	<0.15	<0.10	<0.10	<0.15	<0.10	<0.10	<0.15	<0.10
1,1,2-Trichloroethane	ug/L	5	3		<0.13	<0.13	<0.13	<0.26	<0.13	<0.13	<0.26	<0.13	<0.13	<0.26	<0.13
<b>Trichloroethylene</b>	ug/L	5	0		<0.25	<0.25	<0.25	<b>[0.22]</b>	<0.25	<0.25	<b>[0.21]</b>	<0.25	<0.25	<0.18	<0.25
<b>Trichlorofluoromethane</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.16	n/r	n/r	<0.16	n/r	n/r
1,2,3-Trichloropropane	ug/L	--	--		<0.35	<0.35	<0.35	<0.21	<0.35	<0.35	<0.21	<0.35	<0.35	<0.21	<0.35
Trichlorotrifluoroethane	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.18	n/r	n/r	<0.18	n/r	n/r
<b>1,2,4-Trimethylbenzene</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.15	n/r	n/r	<0.15	n/r	n/r
<b>1,3,5-Trimethylbenzene</b>	ug/L	--	--		n/r	n/r	n/r	n/r	n/r	<0.14	n/r	n/r	<0.14	n/r	n/r
Vinyl Chloride	ug/L	0.2	0		<0.19	<0.19	<0.19	<0.11	<0.19	<0.19	<0.11	<0.19	<0.19	<0.11	<0.19
Xylene, Total	ug/L	10000	10000		<0.63	<0.63	<0.63	<0.55	<0.63	<0.63	<0.55	<0.63	<0.63	<0.55	<0.63
<b>Total Trihalomethanes (TTHM)</b>	ug/L	80	--		ND	<b>0.74</b>	ND	<b>7.2</b>	<b>0.97</b>	<b>7.2</b>	<b>2.4</b>	<b>5.0</b>	<b>5.6</b>	<b>3.3</b>	<b>7.6</b>

\* Disinfection By-Products

n/r = Not Reported

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

Shading/bold type is used for ease of identifying detections

Table A-6. Disinfection By-Products Measured at Distribution System Locations

Disinfection By-Products	MCL	Units	Date	HSR	128	HLG	IEM	FS-5	MDS	LS
				8/12	8/12	8/12	8/11	8/11	8/11	8/12
Bromodichloromethane	--	ppb		0.98	[0.22]	0.83	1.5	0.83	<0.13	1.0
Bromoform	--	ppb		2.0	<0.21	[0.30]	1.1	1.1	<0.21	1.4
Chloroform	--	ppb		0.47	[0.17]	0.67	0.72	[0.32]	<0.12	0.58
Dibromochloromethane	--	ppb		2.2	[0.20]	0.74	1.8	1.6	<0.17	1.7
<b>Total Trihalomethanes (TTHM)</b>	80	ppb		5.7	0.59	2.5	5.1	3.9	0.00	4.7
Dibromoacetic acid	--	ppb		1.3	<0.14	<0.14	0.87	1.2	<0.14	1.0
Dichloroacetic acid	--	ppb		<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
Monobromoacetic acid	--	ppb		<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Monochloroacetic acid	--	ppb		<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47
Trichloroacetic acid	--	ppb		<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
<b>Total Haloacetic Acid (HAA5)</b>	60	ppb		1.3	0.0	0.0	0.87	1.2	0.0	1.0

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

**KEY:**

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