

# Water Quality Monitoring Report 2008 Monitoring Schedule

Monthly Report for: **Nov-08**



Analyte Group	Sample Locations	Monitoring Requirements (# of Samples)		Monitoring Activity (# of samples)		Violations & Public Notices
		Monitoring Period	2008 Annual Requirement	Current Month	Year to Date 2008	Year to Date
<b>Daily/Routine Samples</b>						
Coliform Bacteria	Operating Wells and Distribution Sites	150	1800	440	4011	0
Free Chlorine Residual "Grab" Samples	Operating Wells and Distribution Sites	160 <sup>1</sup>	1900 <sup>1</sup>	705	6975	0
Fluoride	Operating Wells	450 <sup>1</sup>	5400 <sup>1</sup>	449	4603	0
<b>Quarterly Samples</b>						
Volatile Organic Compounds (41 analytes)	Wells	4 <sup>1</sup>	16 <sup>1</sup>	0	13	0
Coliform Bacteria (Raw Water)	Wells	21 <sup>1</sup>	84 <sup>1</sup>	21	87	0
<b>Annual Samples</b>						
Inorganic Contaminants <sup>2</sup> (28 analytes)	Wells	21	21	0	23	0
Volatile Organic Compounds <sup>2</sup> (41 analytes)	Wells	17	17	0	17	0
Disinfection Byproducts - Total Trihalomethanes & Haloacetic Acids	Distribution Sites	7	7	0	7	0
<b>Specialty Samples</b>						
Synthetic Organic Compounds (2 analytes)	Wells	1	1	0	1	0
Radionuclides (4 analytes)	Wells	21	21	16	54	0
Unregulated Contaminants (UCMR2 - 25 analytes)	Wells	22	22	0	22	0
	Distribution Sites	7	7	0	7	0
Iron & Manganese	Wells	na	na	12	143	na
	Residential Taps	na	na	16	57	na

(1) Sampling requirement will vary depending on the number of wells in operation during specific days or quarters  
 (2) Sampling is usually completed June to September in each calendar year, with results reported in the month following sampling.

Calls Logged to the Water Quality Correspondence Database - 2008  
Update: 11/5/08

Year	Month	All Calls	Color	Manganese	Pressure	Taste	Odor	No Water	Other
2008	January	69	41	1	1	7	5	1	17
2008	February	41	18	4	2	1	1	0	19
2008	March	84	54	2	7	4	5	0	18
2008	April	131	78	4	5	6	6	6	35
2008	May	126	68	3	5	7	10	10	40
2008	June	119	66	3	20	2	4	3	29
2008	July	125	68	1	7	3	12	6	32
2008	August	66	46	1	4	2	7	0	12
2008	September	93	50	2	9	7	7	1	26
2008	October	59	26	1	3	2	3	1	26
2008	November								
2008	December								
2008	TOTAL	913	515	22	63	41	60	28	254

Year	Month	All Calls	Color	Manganese	Pressure	Taste	Odor	No Water	Other	Alder District
2008	October	1	0	0	0	0	0	0	1	01
2008	October	2	2	0	0	0	0	0	0	02
2008	October	5	2	0	0	0	0	0	3	03
2008	October	2	2	0	0	0	0	0	0	04
2008	October	1	0	0	0	0	0	0	1	05
2008	October	9	6	0	1	1	1	1	1	06
2008	October	2	0	0	0	0	0	0	2	07
2008	October	1	0	0	0	0	0	0	1	09
2008	October	1	0	0	0	0	0	0	1	10
2008	October	3	1	0	0	0	0	0	2	11
2008	October	3	2	0	0	0	0	0	1	12
2008	October	5	1	1	1	0	0	0	3	13
2008	October	2	1	0	1	0	0	0	0	14
2008	October	2	1	0	0	0	1	0	0	15
2008	October	3	0	0	0	1	1	0	1	16
2008	October	4	1	0	0	0	0	0	3	17
2008	October	6	6	0	0	0	0	0	0	18
2008	October	2	0	0	0	0	0	0	2	19
2008	October	2	0	0	0	0	0	0	2	none
2008	October	3	1	0	0	0	0	0	2	unknown

Year	Month	All Calls	Color	Manganese	Pressure	Taste	Odor	No Water	Other	Alder District
2008	September	1	0	0	0	0	0	0	1	01
2008	September	5	4	0	0	0	1	0	0	03
2008	September	4	1	0	0	0	0	0	3	04
2008	September	2	1	0	0	0	0	0	1	05
2008	September	16	11	1	1	0	0	0	4	06
2008	September	2	1	0	1	0	0	0	0	07
2008	September	2	1	0	0	0	0	0	1	08
2008	September	5	0	0	1	2	2	0	2	09
2008	September	3	1	0	1	0	0	1	1	10
2008	September	4	1	1	0	0	0	0	3	11
2008	September	2	2	0	0	0	0	0	0	12
2008	September	8	7	0	0	0	0	0	1	13
2008	September	5	1	0	0	0	2	0	2	14
2008	September	11	9	0	0	1	0	0	2	15
2008	September	3	1	0	0	0	0	0	2	16
2008	September	8	3	0	4	1	1	0	0	17
2008	September	8	4	0	1	3	1	0	1	19
2008	September	1	1	0	0	0	0	0	0	20
2008	September	3	1	0	0	0	0	0	2	none

To: Water Utility Board

From: Joseph Grande, Water Quality Manager 

Date: November 3, 2008

Subject: Distribution System Chlorine Monitoring

## CHLORINE MONITORING

Madison Water Utility maintains automated chlorine analyzers at all 23 wells. These units continuously measure the chlorine level of drinking water as it enters the water distribution system. The results are transmitted, in real-time, to the operations control room where they are monitored by a 24-hour water operator. Standard operating procedures require immediate action if the measured chlorine amount is outside the normal operating range of 0.15–0.55 mg/L. The target level for water entering the system is a minimum of 0.3 mg/L. Water Utility staff also visits each unit well daily to collect a grab sample and test the chlorine level. These samples are collected to verify the chlorine level of water leaving the unit and confirm that the chlorine analyzer is functioning properly. The grab sample indicates the chlorine level at a single point in time unlike the automated chlorine analyzer, which collects continuous data that is reported directly to the water operator.

The Water Utility also collects grab samples and measures the chlorine level at 29 representative sample locations throughout the distribution system. There are 15 locations on the west side of town (sampled on Mondays and Wednesdays) and 14 sites on the east side (sampled on Tuesdays and Thursdays). The sites include elevated towers, municipal buildings, and local schools. Chlorine measurements are made when water samples are collected for bacteriological analysis. These results are used to confirm that a chlorine residual is detectable (defined as  $\geq 0.1$  mg/L) at all points in the distribution system.

A total of 2,164 chlorine measurements were made in the distribution system from January 1 through October 7, 2008. The majority of measurements (90%) were in the range of 0.2 to 0.45 mg/L while the average concentration was 0.34 mg/L. Twenty readings measured less than 0.1 mg/L. All 20 samples were taken at the Hawks Landing Golf Course maintenance facility during the period of January through March. The low seasonal readings are due to its location at the end of a large water main where limited water is used during the off-season. Figure 1 illustrates the distribution of chlorine measurements for year-to-date samples collected in 2008.

Historically, chlorine levels are higher today than three years ago. Samples collected in April of 2005 showed that the distribution samples measured 0.03-0.23 mg/L with a median of 0.12 mg/L. During the same period in 2008, samples ranged from 0.13-0.52 mg/L with a median of 0.34 mg/L.

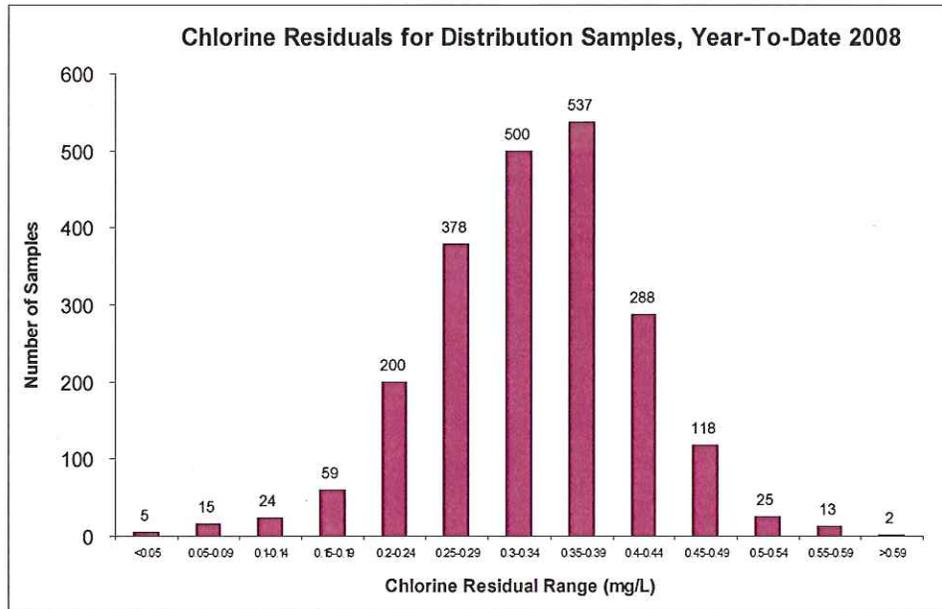


Figure 1. Distribution system chlorine residuals for January through October 7, 2008

At the June 19, 2007 Water Board meeting, chlorine measurements for the periods of April 2005 and April 2007 were compared and discussed. Figure 2 includes those data in addition to April 2008 data. The figure illustrates how the chlorine levels in the distribution system have changed dramatically over the last several years. For example, 96% of samples collected in April 2005 measured below 0.2 mg/L compared with fewer than 2% measuring below that level in April 2008. In addition, in April 2005 no distribution sample measured higher than 0.23 mg/L of chlorine while in April 2008 nearly 90% of all samples measured higher than that amount.

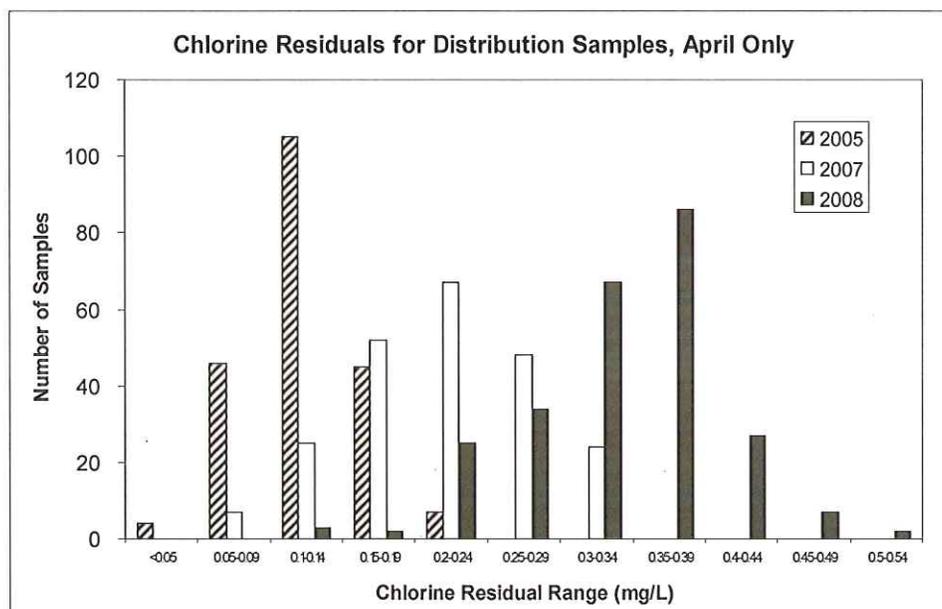


Figure 2. April distribution system chlorine residuals for 2005, 2007, and 2008

The transition to higher chlorine levels in the distribution system followed the Water Utility Board's adoption of a higher target level in June 2007. This change was made to ensure adequate disinfection against potential microbes including viruses that might be present in groundwater. The change was also implemented to provide a margin of system, facilitate system operation, and prepare for requirements of a federal groundwater rule that will be implemented by the end of 2009.

## CUSTOMER COMPLAINTS

Customer complaints about chlorine are down about 20% this year compared to last year despite the increase in chlorine level. A total of 99 chlorine-related complaints were logged in 2007 (57) and so far this year (42). Reports of chlorine odor and taste typically increase as seasonal wells are brought back on-line in the spring. Often, these customers are receiving water that has spent less time in the water mains where there has been less time for the chlorine to decay. Rather than showing a system problem, these reports reflect a change in the water being supplied to a given area.

Water Utility staff advises customers with sensitivities to chlorine to draw water into a pitcher and allow the chlorine to degas or to consider filtration for the removal of chlorine. Activated carbon filters, whether faucet-mounted or as a component of a carafe-style pitcher, are highly effective at removing chlorine and improving the taste and/or smell of water. Showerheads with incorporated carbon filters are also commercially available. This type of fixture may be appropriate for customers with sensitive skin.

## DISINFECTION BY-PRODUCTS

One potential consequence of increasing the chlorine dose is an increase in the concentration of disinfection by-products. These by-products are chemicals that form when chlorine interacts with organic impurities that are naturally present in source water. Because Madison Water Utility relies exclusively on groundwater that has little organic material, the amount of disinfection by-products that form is low.

Seven distribution sample locations are annually tested for the level of two classes of disinfection by-products: total trihalomethanes (TTHM) and haloacetic acids (HAA5). Trihalomethanes, which include bromodichloromethane, bromoform, chloroform, and dibromochloromethane, are measured at wells and reservoirs as part of volatile organic compound (VOC) testing. Safe Drinking Water Act rules mandate that the combined concentration of the four regulated trihalomethanes not exceed 80 micrograms per liter (ug/L) or parts per billion (ppb). Samples collected at Madison wells and in the distribution system are consistently below 10 ppb with most measuring below 5 ppb.

The concentration of five regulated haloacetic acids must not exceed 60 ppb. Annual sampling at seven distribution system locations has detected only one of these substances, dibromoacetic acid. The level of this disinfection by-product is consistently below 1 ppb. Complete disinfection by-product test results were presented in the *Report to Water Utility Board on Annual Water Quality Monitoring Results* that was an agenda item for the September 2008 Water Utility Board meeting.

Table 1 below summarizes the disinfection by-products test results for samples collected at the representative distribution locations and Water Utility facilities including wells, reservoirs, and pump stations.

Table 1. Summary of disinfection by-product concentrations showing the maximum levels at seven distribution locations for years 2006-2008 and the range of concentrations in 2008 for Water Utility facilities including wells, reservoirs, and booster stations.

Disinfection By-Products	Distribution Locations (7)			Wells & Water Facilities (2008)			
	2008	2007	2006	Samples	Minimum	Median	Maximum
Bromodichloromethane	1.6	1.3	1.3	39	ND	0.31	1.8
Bromoform	0.76	0.66	0.93	39	ND	0.23	1.5
Chloroform	1.3	0.69	0.62	39	ND	ND	2.3
Dibromochloromethane	1.5	1.5	2.0	39	ND	0.38	2.3
<b>Total Trihalomethanes (TTHM)</b>	<b>4.7</b>	<b>4.2</b>	<b>4.8</b>	<b>39</b>	<b>ND</b>	<b>1.4</b>	<b>6.2</b>
Dibromoacetic acid	0.82	0.53	0.56				
Dichloroacetic acid	ND <sup>#</sup>	ND	ND				
Monobromoacetic acid	ND	ND	ND				
Monochloroacetic acid	ND	ND	ND				
Trichloroacetic acid	ND	ND	ND				
<b>Total Haloacetic Acid (HAA5)</b>	<b>0.82</b>	<b>0.53</b>	<b>0.56</b>				

\* Units are micrograms per liter (ug/L) or parts per billion (ppb)

\* ND = none detected; below the level of detection