

# Internal Monitoring Report

Policy #: O-2B Water Quality  
Monitoring Frequency: Quarterly

Date: July 23, 2013

I certify that the following information is true.

Signed  \_\_\_\_\_, General Manager

## Policy Language:

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

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

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

## General Manager's interpretation and its justification:

Few things are more vital to a community than the availability of high quality drinking water. It promotes public health, public safety, and the economic interests of our community. To that end, the water utility will consistently deliver water that meets the primary, health-based drinking water standards, the secondary (aesthetic) standards, and the additional policy goals established by the Board. The Water Utility Procedural Guideline GUIDE 3, which establishes policies regarding iron and manganese, contains the following:

The Madison Water Utility, under normal operating conditions, shall provide water that contains less than the National Secondary Drinking Water Standard for Fe (currently 0.3 mg/L) and Mn (currently 0.05 mg/L) at the customer's tap.

I interpret this to mean that 95<sup>th</sup> percentile results from our routine distribution water quality monitoring program shall be less than these values for iron and manganese.

Utility staff will remain vigilant in following developments related to currently unregulated and emerging contaminants like pharmaceuticals, endocrine disruptors, and chromium-6 that may pose problems in the future. Furthermore, the utility will employ multiple methods to adequately inform its consumers of the safety and quality of their drinking water including the federally-required Consumer Confidence Report (CCR), the water utility website, e-mail distribution lists, neighborhood listservs, citizen meetings, and through staff contact in the field and office.

## **Data directly addressing the General Manager's interpretation:**

### Primary Drinking Water Contaminants:

None of 911 water samples collected between April and June had coliform bacteria present. Samples were collected from routine monitoring points in the distribution system and showed satisfactory chlorine levels.

Twenty wells, all except Well 8 and Well 17, were sampled and tested in June for a broad suite of inorganic parameters including nitrate, arsenic, lead, iron, manganese and other regulated and unregulated substances. All detections of regulated contaminants were well below the maximum contaminant level (MCL). Summary results, including the maximum level found and detections that are below the Preventive Action Limit (PAL), are included in the updated Water Quality Watch List (attached). Eight wells are included on the watch list because the nitrate level is greater than 2 mg/L but below the MCL of 10 mg/L. The highest levels of nitrate are found at Well 13 and Well 23.

Fifteen wells were tested between April and June for volatile organic compounds (VOC). Ten wells did not show the presence of any VOC except for low levels of some disinfection by-products caused by drinking water chlorination. The other five wells [#6, #9, #15, #18, and #27] showed the presence of PCE ranging from 0.24 to 2.8 µg/L compared to the MCL of 5 µg/L. These five wells previously showed the presence of at least one VOC and they are regularly tested for volatile organic compounds.

The treatment facility to remove VOC from Well 15 water is currently in operation. The first water sample tested showed the complete removal of tetrachloroethylene (PCE) and trichloroethylene (TCE). Additional tests are scheduled to evaluate contaminant removal at higher flow rates (2200 gpm vs. 1200 gpm).

### Policy Goals for Iron and Manganese:

Summary statistics for routine distribution testing of iron and manganese for the periods from April through June and year-to-date are found in the tables below. The results show compliance with the policy goal although three samples exceeded the iron threshold. Each of the three samples was collected at a location receiving water from Well 7, a source with iron that exceeds the secondary drinking water standard. These results, combined with recent customer complaints, further document the need for iron and manganese filtration at Well 7.

Manganese, µg/L

	Apr - Jun	Year-to-Date
Policy Goal	50	50
Median	2.1	2.3
Average	4.0	4.0
95th	16	13
Maximum	33	44
Count	87	173
>50	0	0

Iron, mg/L

	Apr - Jun	Year-to-Date
Policy Goal	0.3	0.3
Median	0.01	0.01
Average	0.04	0.03
95th	0.21	0.13
Maximum	0.52	0.52
Count	87	173
>0.3	3	3

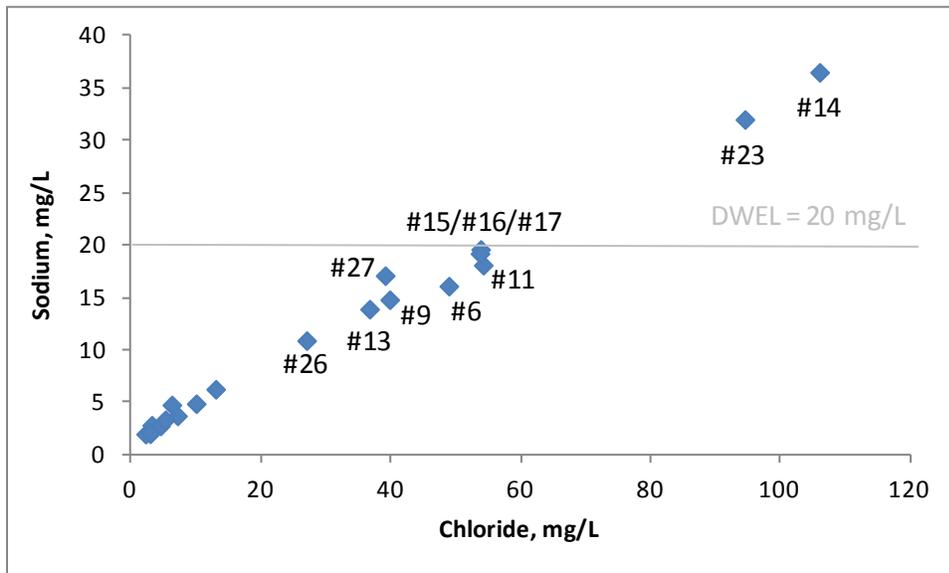
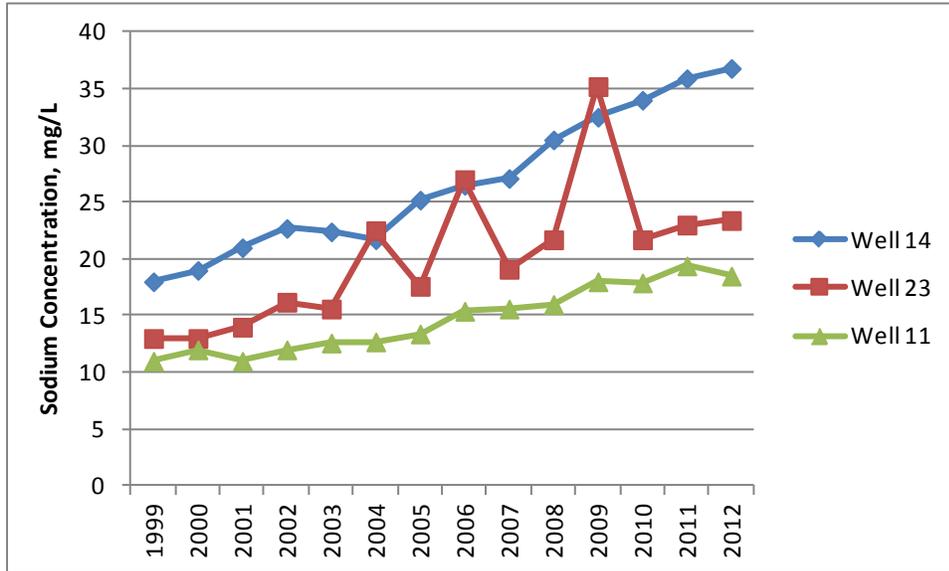
Unregulated and Emerging Contaminants:

Testing for 1,4-dioxane is now complete at twenty wells. Sixteen wells did not show its presence. Previously, four wells (#9, #11, #14, and #15) were shown to have measurable amounts of this unregulated contaminant. Both pre- and post-treatment water samples were collected at the Well 15 VOC removal facility. Test results are not yet available. Well 8 and Well 17 will be tested later this month.

The utility continues to monitor all wells twice per year for chromium-6. Samples were collected from nineteen wells in either June or July. The remaining samples will be collected this summer and fall.

Sodium in Drinking Water:

Sodium levels at some municipal wells have been increasing in recent years. The highest levels are consistently found at Well 14 and Well 23, which recently tested 36.5 and 32.0 mg/L sodium, respectively. Recent trends are shown in the figure below.



Other wells, namely 6, 11, 15, 16, and 27, are approaching the 20 mg/L level (see above figure). Sodium levels have been gradually increasing over the last decade at these wells.

<i>Sodium levels measured in mg/L</i>				
<b>Year</b>	<b>Well 6</b>	<b>Well 15</b>	<b>Well 16</b>	<b>Well 27</b>
<b>2003</b>	9.5	13.6	9.9	11.6
<b>2004</b>	9.4	14.0	10.4	13.7
<b>2005</b>	9.6	14.8	11.0	17.8
<b>2006</b>	9.8	15.5	12.5	16.7
<b>2007</b>	11.4	16.3	13.5	18.5
<b>2008</b>	11.2	17.3	13.0	28.9
<b>2009</b>	12.7	18.2	15.7	16.8
<b>2010</b>	13.1	19.0	16.1	15.7
<b>2011</b>	14.7	19.5	17.5	16.1
<b>2012</b>	15.0	19.1	17.4	15.8
<b>2013</b>	16.1	19.6	19.2	17.1
<b>Change</b>	6.6	6.0	9.3	5.5

EPA's *Consumer Acceptability Advice and Health Effects Analysis on Sodium* (2003) recommends reducing sodium levels to between 30 and 60 mg/L based on aesthetic effects including taste. Drinking water within this range of sodium is unlikely to be perceived as salty by most individuals. The report identifies a guidance level of 20 mg/L sodium for individuals on a sodium restricted diet; however, it cautions that this level should not be extrapolated to the entire population.

The proposed 2014 Operating Budget will include a request for funds to initiate a study to evaluate treatment alternatives to mitigate rising sodium levels at Well 14 and an associated cost estimate for each alternative.

Public Outreach on Water Quality:

The Annual Drinking Water Quality Report, also called the Consumer Confidence Report (CCR), was posted to our website on May 9<sup>th</sup>. A press release, water quality listserv notice, and post cards sent to 114,009 postal addresses announced the availability of the report. Eighty-four requests for a paper copy have been satisfied.

*I report compliance.*

**Attachments:**

Water Quality Watch List

**Madison Water Utility  
Water Quality Watch List**

**Organics - Regulated**

Contaminant	Maximum*	Units	MCLG	PAL	MCL	Detects Below PAL%	Watch List	Action Plan	Reference
1,2-Dichloroethane	[0.17]	µg/L	zero	0.5	5	#17	none		NR 140.10
1,1-Dichloroethylene	0	µg/L	7		7				
1,2-Dichloroethylene (cis)	[0.40]	µg/L	70	7	70	#8, #9, #11, #14	none		NR 140.10
Ethylbenzene	[0.14]	µg/L	700	140	700	#225	none		NR 140.10
Tetrachloroethylene [PCE]	3.9	µg/L	zero	0.5	5	#6, #27	#9, #11, #14, #15, #18	#15 - Low-profile Air Stripper, Groundwater Investigation; #11, #14, #18 - Budget One GW Investigation per Year	NR 140.10
Toluene	2.2	µg/L	1000	160	1000	#15, #18, #25	none		NR 140.10
1,1,1-Trichloroethane	[0.29]	µg/L	200	40	200	#9, #18	none		NR 140.10
Trichloroethylene [TCE]	0.43	µg/L	zero	0.5	5	#11, #14, #15, #18, #27	none		NR 140.10
Xylene, Total	1.5	µg/L	10000	400	10000	#225	none		NR 140.10

\* Maximum detection observed at any Madison well from 2009 through 2013

% Detected in at least one sample collected from 2009 through 2013

**Organics - Unregulated**

Contaminant	Maximum*	Units	MCLG	PAL	ES	Wells with Detects%	Watch List	Action Plan	Reference
Dichlorodifluoromethane	[0.23]	µg/L	n/a	200	1000	#14	none		NR 140.10
1,1-Dichloroethane	0.07	µg/L	n/a	85	850	#9	none		NR 140.10
1,4-Dioxane	0.63	µg/L	n/a	0.3	3	#9, #11, #14, #15	#11, #14	Monitor	NR 140.10
Methyl t-butyl ether [MTBE]	[0.14]	µg/L	n/a	12	60	#15	none		NR 140.10
Trichlorofluoromethane	1.3	µg/L	n/a	698	3490	#11	none		NR 140.10
1,2,4-Trimethylbenzene	0.64	µg/L	n/a	96	480	#7, #15	none		NR 140.10
1,3,5-Trimethylbenzene	[0.20]	µg/L	n/a	96	480	#15	none		NR 140.10

\* Maximum detection observed at any Madison well from 2009 through 2013

% Detected in at least one sample collected from 2009 through 2013

**Radionuclides**

Contaminant	Maximum	Units	MCLG	Watch	MCL	Wells with Detects	Watch List	Action Plan	Reference
Gross alpha	13.8	pCi/L	zero	5	15	All Wells	#7, #13, #19, #25, #27, #28, #30	Monitor	NR 809.50
Gross beta	14.8	pCi/L	zero	10	50	All Wells	#19, #28	Monitor	NR 809.50
Combined Radium	5.8	pCi/L	zero	2	5	All Wells	#7, #8, #15, #19, #27, #28, #30	Monitor	NR 809.50
Uranium	2.0	(ug/L)	zero	3	30	All Wells	none		NR 809.50

ES - Enforcement Standard (NR 140 - Groundwater Quality)

MCL - Maximum Contaminant Level (Legal Limit)

MCLG - MCL Goal (Public Health Goal)

PAL - Preventive Action Limit (NR 140 - Groundwater Quality)

**Madison Water Utility  
Water Quality Watch List**

**Inorganics - Regulated**

Substance	Maximum*	Units	MCLG	PAL	MCL	Detects Below PAL	Watch List	Action Plan	Reference
Antimony	0.2	(ug/l)	6	1.2	6	#11	none		NR 140.10
Arsenic	0.7	(ug/l)	zero	1	10	#7, #8, #17, #19, #23, #24, #26, #27, #28, #29, #30	none		NR 140.10
Barium	66	(ug/l)	2000	400	2000	All Wells	none		NR 140.10
Chromium	2.2	(ug/l)	100	10	100	All Wells	none		NR 140.10
Copper	60	(ug/l)	1300	130	1300	All Wells	none		NR 140.10
Lead	0.6	(ug/l)	zero	1.5	15	All Except #14, #16, #19, #27, #29, #30	none		NR 140.10
Nickel	3.0	(ug/l)	100	20	100	All Wells	none		NR 140.10
Nitrogen-Nitrate	4.3	(mg/l)	10	2	10	#9, #12, #18, #20, #25, #27, #29	#6, #11, #13, #14, #15, #16, #23, #26	Monitor	NR 140.10
Selenium	1.5	(ug/l)	50	10	50	#6, #9, #11, #13, #14, #15, #16, #23, #25, #26, #27, #29	none		NR 140.10
Thallium	0.3	(ug/l)	0.5	0.4	2	#11, #17, #19, #23, #26, #27	none		NR 140.10

\* Based on 2013 annual test data

**Inorganics - Unregulated**

Substance	Maximum*	Units	MCLG	Watch	SMCL	Wells with Detects	Watch List	Action Plan	Reference
Aluminum	3.3	(ug/l)	n/a	50	200	All Wells	none		NR 809.70
Chloride	106	(mg/l)	n/a	125	250	All Wells	none		NR 809.70
Iron	0.39	(mg/l)	n/a	0.1	0.3	All Except #6, #9, #11, #12, #14, #16, #18, #20	#7, #8, #19, #24, #27, #28, #30	#7 - Install Filtration (2013), #8 - Install Filtration (2014), #19 - Install Filtration (2016), #30 - Install Filtration (2018)	NR 809.70
Manganese	42	(ug/l)	n/a	20	50	All Except #16	#7, #8, #17, #19, #23, #24, #26, #27, #28	#7 - Install Filtration (2013), #8 - Install Filtration (2014), #19 - Install Filtration (2016)	NR 809.70
Sodium	37	(mg/l)	n/a	20	20	All Wells	#14 and #23	Monitor	EPA DWEL
Sulfate	40	(mg/l)	n/a	125	250	All Wells	none		NR 809.70
Zinc	15	(ug/l)	n/a	2500	5000	All Wells	none		NR 809.70

\* Based on 2013 annual test data

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