

Internal Monitoring Report

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

Date: October 22, 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 95th 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:

On October 2, the water utility received Notice of Noncompliance from the DNR arising from a laboratory error. Specifically, dual samples collected on July 17 for disinfection by-product analysis [total trihalomethanes and haloacetic acids] were not analyzed due to an equipment malfunction at the lab. The monitoring violation occurred because the utility was not able to re-sample within the monitoring period between 7/15/13 and 7/25/13. Neither the safety nor quality of Madison tap water was in question. The level of disinfection by-products is consistently well below Safe Drinking Water standards due to the clean, high-quality water drawn from the local aquifer. Follow-up samples collected in August showed a maximum total trihalomethane level of 10 µg/L compared to the MCL of 80 µg/L. Results in August were similar to those in July. Similarly, the maximum haloacetic acid level in August was 3.6 µg/L compared to the MCL of 60 µg/L. The utility is required to annually provide public notice until it is back into compliance. Public notice is planned to occur through use of the annual consumer confidence report (CCR) in spring 2014.

None of 927 water samples collected between July and September showed the presence of coliform bacteria. The samples were collected from routine monitoring points in the distribution system and showed satisfactory chlorine levels.

Well 8 and Well 17 were sampled in August and July, respectively, and tested 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). These results are now included in the updated Water Quality Watch List (attached).

Eight wells were tested between July and September for volatile organic compounds (VOC). Six wells [#6, #9, #11, #14 #15, and #18] are regularly tested based on previous detections. Test results are shown below.

| VOLATILE ORGANIC COMPOUND | MCL, µg/L | Well 6 | Well 8 | Well 9 | Well 11 | Well 14 | Well 15 | Well 15 | Well 17 | Well 18 |
|--------------------------------|-----------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| | Date | 7/17 | 8/21 | 7/16 | 7/16 | 7/17 | 7/16 | 8/21 | 8/21 | 7/16 |
| 1,2-Dichloroethylene (cis) | 70 | <0.13 | [0.18] | <0.13 | [0.30] | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 |
| Tetrachloroethylene [PCE] | 5 | 0.68 | <0.18 | 1.3 | [0.36] | [0.44] | <0.18 | <0.18 | <0.18 | 0.98 |
| Trichloroethylene [TCE] | 5 | <0.19 | <0.19 | <0.19 | [0.20] | [0.20] | <0.19 | <0.19 | <0.19 | <0.19 |
| Trichlorofluoromethane | n/a | <0.13 | <0.13 | <0.13 | 0.72 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 |
| DISINFECTION BY-PRODUCT | | | | | | | | | | |
| Bromodichloromethane | 80 | <0.18 | 4.2 | [0.46] | <0.18 | <0.18 | <0.18 | <0.18 | 0.84 | <0.18 |
| Bromoform | 80 | <0.17 | [0.48] | [0.29] | <0.17 | <0.17 | [0.23] | <0.17 | [0.17] | <0.17 |
| Chloroform | 80 | <0.20 | 4.2 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | [0.64] | <0.20 |
| Dibromochloromethane | 80 | <0.15 | 2.9 | 0.62 | [0.16] | [0.16] | [0.24] | <0.15 | 0.71 | <0.15 |

The treatment facility to remove VOCs from Well 15 is currently operating. Samples continue to show complete removal of tetrachloroethylene (PCE) and trichloroethylene (TCE) – see table above.

Policy Goals for Iron and Manganese:

Summary statistics for routine distribution testing of iron and manganese for the periods from July through September and year-to-date are found in the attached tables. The results show compliance with the policy goal although four samples exceeded the iron benchmark. These samples were collected at a location most likely receiving water from Well 7, a source with iron that exceeds the secondary drinking water standard.

| Manganese, µg/L | | | Iron, mg/L | | |
|------------------------|-----------|--------------|------------------------|-------------|--------------|
| | Jul – Sep | Year-to-Date | | Jul – Sep | Year-to-Date |
| Policy Goal | 50 | 50 | Policy Goal | 0.3 | 0.3 |
| Median | 2.5 | 2.4 | Median | 0.01 | 0.01 |
| Average | 4.5 | 4.1 | Average | 0.04 | 0.03 |
| 95th | 15 | 14 | 95th | 0.21 | 0.16 |
| Maximum | 27 | 44 | Maximum | 0.46 | 0.52 |
| Count | 86 | 259 | Count | 86 | 259 |
| >50 | 0 | 0 | >0.3 | 4 | 7 |

Unregulated and Emerging Contaminants:

Testing for 1,4-dioxane was conducted at all twenty-two wells. It was not found at 18 wells while four wells (#9, #11, #14, and #15) had measurable amounts of this currently unregulated contaminant. The highest level was detected at Well 11; it measured 0.38 µg/L in August. Previous test results at that well ranged from 0.39 to 0.63 µg/L. Samples were also collected in August at Well 15 both before and after the air stripper. The removal of 1,4-dioxane was negligible (6% reduction).

Semi-annual chromium-6 monitoring continued during the summer and fall. The second sample was collected at 18 wells bringing a conclusion to this year’s testing. Test results are not yet available. In August, a draft MCL for chromium-6 was posted for public comment by the California Department of Public Health. The regulatory limit was set at 0.01 mg/L or 10 µg/L. This proposed limit is five times higher than the levels observed at Well 6 and Well 14, the two Madison wells with the highest chromium. No federal limit has been established for chromium-6, however, the MCL for total chromium currently stands at 0.1 mg/L.

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 |
| 1,2-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, #18 | #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 | µg/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 | µg/l | 6 | 1.2 | 6 | #11 | none | | NR 140.10 |
| Arsenic | 0.7 | µg/l | zero | 1 | 10 | #7, #8, #17, #19, #23, #24, #26, #27, #28, #29, #30 | none | | NR 140.10 |
| Barium | 66 | µg/l | 2000 | 400 | 2000 | All Wells | none | | NR 140.10 |
| Chromium | 2.2 | µg/l | 100 | 10 | 100 | All Wells | none | | NR 140.10 |
| Copper | 60 | µg/l | 1300 | 130 | 1300 | All Wells | none | | NR 140.10 |
| Lead | 0.6 | µg/l | zero | 1.5 | 15 | All Except #14, #16, #19, #27, #29, #30 | none | | NR 140.10 |
| Nickel | 3.0 | µg/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 | µg/l | 50 | 10 | 50 | #6, #9, #11, #13, #14, #15, #16, #23, #25, #26, #27, #29 | none | | NR 140.10 |
| Thallium | 0.3 | µg/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 | µg/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 | µg/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 | 51 | mg/l | n/a | 125 | 250 | All Wells | none | | NR 809.70 |
| Zinc | 15 | µg/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