Health Impacts from Drinking Water Treatment

Water Treatment Industry and Utility Perspective

Challenges to Providing Safe Drinking Water in the Midwest: A Symposium
Drake University
September 21, 2017
Ed Moreno
Nature of the Drinking Water Industry

• Referred to as the “Silent Industry”
• Technical in nature and engineering oriented
• Heavily regulated but compliance is mostly self-monitoring and reporting
• Water Utility is typically an enterprise activity within the local government
  – Usually self-funded with “cost-of-service” rates
  – Public pressure to keep rates low
Nature of the Drinking Water Industry
(continued)

• Primary Mission Statement Activities – Provide water for:
  – Drinking water and general consumption purposes
  – Fire protection
  – Commercial and Industrial Uses
  – Sanitary sewer conveyance

• Criteria most frequently used by customers to “assess” their drinking water
  – Aesthetics (acceptable taste and absence of any odor)
  – Perception that cost is reasonable
  – Quality and safety are generally a secondary consideration, except when it becomes “newsworthy”
Drinking Water Regulations and Standards

• US Environmental Protection Agency (US EPA)
  – Establishes National Water Quality Standards and Regulations
  – Grants “Primacy” to states for administration of their drinking water programs
  – Oversees state drinking water programs
  – Ensures compliance with all applicable rules and regulations
  – Provides funding to states for administration of their drinking water programs

• State Drinking Water Programs (e.g. Iowa Dept. of Natural Resources)
  – Adopt and Ensure compliance with all Federal Standards and Regulations
  – State Regulations and Standards cannot be less “stringent” than Federal
Drinking Water Regulations and Standards
(continued)

• Drinking Water Standards
   (Safe Drinking Water Act- SDWA)
   – EPA has adopted 83 Standards for drinking water
     • Organic Compound
     • Inorganic Compounds
     • Radiological
     • Microbial
     • Disinfectant and Disinfectant Byproducts
   – Maximum Contaminant Level (MCL)
   – Maximum Contaminant Level Goal (MCLG)
   – Secondary Maximum Contaminant Level (SMCL)
October 23, 2014

IOWA CITY, CITY OF
ATTN RICK FOSSE PUBLIC WORKS DIR
410 E WASHINGTON ST
IOWA CITY, IA  52240

SUBJECT: Public Water Supply Operation Permit Renewal and Revision – PWSID# 5225079

Enclosed is the operation permit for IOWA CITY WATER DEPARTMENT, classified as a community public water supply (PWS) by the Iowa Department of Natural Resources (IDNR).

This revision replaces the operation permit executed on June 1, 2012. The IDNR is issuing this revised permit due to an update to your self-monitoring requirements, as required by a change in treatment/source and in accord with my phone discussions with Ed Moreno. WL10 JW #1 – North (1996) and WL 02 JW #2 – South (2002) have been set to Inactive Emergency.

In addition, WL06 SW #1 (1995) has been set to Inactive Other (Capped). The Average and Peak daily production has been updated. The number of service connections has been updated. Leon Schluster’s name has been replaced with Craig Meacham. I have a note on my calendar to change Rick Fosse as PWD to Ron Knoche as PWD, January 1, 2015.

Please be advised that this permit does not address additional sampling requirements that may be assigned as a result of monitoring or maximum contaminant level violations. This includes, but is not limited to, “confirmation,” “replacement” and “repeat” monitoring requirements.

After reviewing the permit, feel free to contact me at 515-725-0289 or E-mail me at cecilia.naughton@dnr.iowa.gov with questions about monitoring requirements. If you have questions relating to source entry points, sampling plans, or need other assistance, you may contact Field Office 6 in Washington at 319-653-2135.

Sincerely,

Cecilia Naughton
Environmental Specialist, Water Supply Operations Section

cc:
[ ] Field Office 6
[ ] File: PWSID # 5225079
[ ] IOWA CITY WATER DEPARTMENT
ATTN ED MORENO PLANT SUPT 410 E WASHINGTON ST, IOWA CITY, IA  52240

Attachments

OP [ X ]
[ X ]
[ X ]
Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR)

Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR) monitoring requirements are based on your source water type and system population. Compliance with this rule is based on each individual distribution system sampling location. If an individual location is sampled quarterly, then compliance is based on the average of the analytical results for the previous four calendar quarters.

A total of 8 sample(s) must be collected per monitoring period, according to the approved sampling plan. Each sample from each location must be analyzed for both Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5). Samples must be collected at the following points and frequencies:

<table>
<thead>
<tr>
<th>Sample location</th>
<th>Facility ID</th>
<th>Sample Point ID</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2312 MORMON TREK RD (HTL)</td>
<td>950</td>
<td>DB01</td>
<td>every year in February, May, August, and November</td>
</tr>
<tr>
<td>701 MORMON TREK RD (HHL)</td>
<td>950</td>
<td>DB02</td>
<td>every year in February, May, August, and November</td>
</tr>
<tr>
<td>2875 COMMERCE DR (HHL)</td>
<td>950</td>
<td>DB03</td>
<td>every year in February, May, August, and November</td>
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<tr>
<td>3850 ROHERT ROAD (HTL)</td>
<td>950</td>
<td>DB04</td>
<td>every year in February, May, August, and November</td>
</tr>
<tr>
<td>2626 BARTEL RD (HTL)</td>
<td>950</td>
<td>DB05</td>
<td>every year in February, May, August, and November</td>
</tr>
<tr>
<td>1930 LAKESIDE DR (HHL)</td>
<td>950</td>
<td>DB06</td>
<td>every year in February, May, August, and November</td>
</tr>
<tr>
<td>2153 ACT CIRCLE (HHL)</td>
<td>950</td>
<td>DB07</td>
<td>every year in February, May, August, and November</td>
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<tr>
<td>507 HIGHLAND AVE (HTL)</td>
<td>950</td>
<td>DB08</td>
<td>every year in February, May, August, and November</td>
</tr>
</tbody>
</table>

Source Water and Treatment Monitoring Requirements

The following samples must be collected at locations representative of each active water source and treatment plant. Samples must be labeled to distinguish between influent and effluent locations. The Carbon, Total Organic (TOC) samples must be analyzed by a laboratory certified by the IDNR; however, the Alkalinity, Total sample only needs to be analyzed by an approved laboratory method.

<table>
<thead>
<tr>
<th>Facility ID: TP02</th>
<th>Treatment Plant Name: PLANT #2</th>
<th>ANALYTE</th>
<th>MONITORING FREQUENCY</th>
<th>SAMPLE PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Carbon, Total Organic (TOC)</td>
<td>1 sample every month</td>
<td></td>
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<tr>
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<td>The sample must be collected at the point of combined source water influent prior to any treatment (Sample Point ID = RAW).</td>
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<td>Alkalinity, Total</td>
<td>1 sample every month</td>
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<td>The sample must be collected at the same time and location as the source water influent TOC sample (Sample Point ID = RAW).</td>
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<tr>
<td></td>
<td></td>
<td>Carbon, Total Organic (TOC)</td>
<td>1 sample every month</td>
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<td>The sample must be collected at the same time as the source water influent TOC sample and at a location no later than the point of combined filter effluent turbidity monitoring (Sample Point ID = CFE).</td>
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</tbody>
</table>
## SURFACE WATER/INFLUENCED GROUNDWATER MONTHLY OPERATION REPORT
### IOWA DNR WATER SUPPLY SECTION
#### Disinfection/Oxidation Data Page

**System Name:** IOWA CITY  
**PWSID #:** 5225079  
**Month:** July  
**Year:** 2017

<table>
<thead>
<tr>
<th>Source/Entry Point (S/E/P)</th>
<th>Chlorine Residual Distribution</th>
<th>CT</th>
<th>Quantity of Disinfectant Used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAY</strong></td>
<td><strong>Number of Tests Taken</strong></td>
<td><strong>Specify Free (F) or Total (T)</strong></td>
<td><strong>Lowest Measured Residual (mg/L)</strong></td>
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<tr>
<td>2</td>
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<tr>
<td>31</td>
<td>12</td>
<td>F</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Total:** 372  
**Avg:** 90  
**Max:** 1.5  
**Min:** 0.0  
**Mean:** 0.84  
**Median:** 1.21  
**CT:** 0.89  
**OCS:** 2.51  
**Discrepancy:** 2.27  

*If continuous monitoring of chlorine is provided, enter "C" in the space provided.

**If chlorine dioxide MRLD of 0.8 mg/L or daily chlorite MCL of 1,0 mg/L is exceeded, then "Chlorine Dioxide/Chlorite Supplemental Monitoring Form" must be completed.

I certify that I am familiar with the information contained in this report and that the information is true, complete, and accurate.

DRC Operator's or Designee's Signature:  
Certificate #: 5164  
Grade: IV  
Date: 8-2-17
SURFACE WATER/INFLUENCED GROUNDWATER MONTHLY OPERATION REPORT FORM

IOWA DNR WATER SUPPLY SECTION
Total Organic Carbon Removal

S/EP: O2
System Name: IOWA CITY
PWSID #: 5225079
Month: July
Year: 2017

Note: Systems are required to run one TOC Sample Set every month. Additional space is provided for those systems that do additional

<table>
<thead>
<tr>
<th>Date</th>
<th>Raw Alkalinity</th>
<th>Raw TOC</th>
<th>Treated TOC</th>
<th>Actual % TOC Removed (calculated)</th>
<th>Step 1 Required % Removal (from Matrix)</th>
<th>Step 1 Removal Ratio</th>
<th>Step 2 Required % Removal (attach Step 2 form)</th>
<th>Step 2 Removal Ratio (calculated)</th>
<th>ACC # used (attach ACC form)</th>
<th>ACC Removal Ratio (calculated)</th>
<th>Compliance Removal Ratio (calculated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/3/2017</td>
<td>250</td>
<td>1.9</td>
<td>1.3</td>
<td>31.6</td>
<td>15</td>
<td>2.11</td>
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</table>

Avg 250 1.9 1.3 31.6 2.11
Max 250.00 1.9 1.3 31.6
Min 250.00 1.9 1.3 31.6 2.11

MONTHLY TOTAL ORGANIC CARBON REMOVAL SUMMARY

<table>
<thead>
<tr>
<th>Raw Water Alkalinity</th>
<th>Raw Water TOC</th>
<th>Treated Water TOC</th>
<th>TOC % Removal Summary</th>
<th>Requirement</th>
<th>TOC Removal Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>260</td>
<td>1.9</td>
<td>1.3</td>
<td>31.6</td>
<td>16</td>
<td>2.11</td>
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</table>

CALCULATION OF ORGANIC CARBON REMOVAL RATIO RUNNING ANNUAL AVERAGE:
The RAA must be calculated at the end of each calendar quarter and include the previous 13 months.

<table>
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<tr>
<th>Actual Month/Year</th>
<th>1</th>
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<tr>
<td>June-17</td>
<td>2.11</td>
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<td>May-17</td>
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<td>April-17</td>
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<td>March-17</td>
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<td>Feb-17</td>
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<td>Dec-16</td>
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<td>Nov-16</td>
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<td>Oct-16</td>
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<td>Aug-16</td>
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<tr>
<td>Monthly Avg</td>
<td>2.11</td>
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</tbody>
</table>

Running Annual Average (RAA)* 1.95

*Should be greater than or equal to 1.00

I certify that I am familiar with the information contained in this report and that the information is true, complete, and accurate.

DRC Operator's or Designee's Signature: [Signature]
Certificate #: 5164
Grade: IV
Date: 8-2-17
Ten Great Public Health Achievements In the 20th Century

• Immunizations
• Motor-Vehicle Safety
• Workplace Safety
• Control in Infectious Diseases – Water Chlorination
• Declines in Deaths from Heart Disease and Stroke
• Safer and Healthier Foods
• Healthier Mothers and Babies
• Family Planning
• Fluoridation of Drinking Water
• Tobacco as a Health Hazard
This photo of the Burlington Street bridge was taken during the flood of 1918.

...EXCEPT THE WATER. THE WATER TASTES LIKE “SPIC N’ SPAN.”
TODAY!

WHAT THE HECK IS THIS?

HELL FROZE OVER!... PIGS FLEW!

MMM... IT'S NITRA-LICIOUS®?

YOU SAID IT! WELL, WHAT'S NEXT? SHOULD I DRINK SOME MORE WATER, GO TO THE BATHROOM, OR TAKE A SHOWER? OR ALL 3 SIMULTANEOUSLY?

AND

IOWA CITIANS APPRECIATED THEIR TAP WATER!!!
New Water Sources

COLLECTOR WELLS  RIVER INTAKE  SAND PIT INTAKE  DEEP WELLS
Iowa City Water Purification Plant
Chemical Storage/Feed Systems

• Potassium Permanganate
• Coagulant
• Polymer
• Lime
• Soda Ash
• Carbon Dioxide
• Polyphosphate
• Orthophosphate
• Fluoride
• Chlorine
• Ammonia
Timeline

• Original preliminary engineering study 1991
  Improvements to existing plant downtown

• Groundwater source investigations 1991-1993
  South of Iowa City

• Second preliminary engineering study 1993
  New plant north of City, abandon old plant

• Distribution system modeling study 1993

• Alluvial horizontal collector well investigations 1994

• Plant design – Design Outline 1995
  35% Value Engineering 1995
  60% Value Engineering 1996
  Bid Letting 12/7/99

• 22 project phases designed & constructed 1995-2003

• Plant construction 2/00 – 2/03

• Plant placed in service 3/03
Iowa City Water Rate Change

<table>
<thead>
<tr>
<th>Year</th>
<th>% Change</th>
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<tbody>
<tr>
<td>1990</td>
<td>6</td>
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<td>2003</td>
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<td>2007</td>
<td>-5</td>
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<td>2015</td>
<td>5</td>
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<tr>
<td>2016</td>
<td>5</td>
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</tbody>
</table>
This photo of the Burlington Street bridge was taken during the flood of 1918.

Flood of 1918
Water produced at the University of Iowa Water treatment plant meets or surpasses all federal and state drinking-water standards at this time.

For information about the University of Iowa water supply, call us at 319-335-5168

Water Source

The University of Iowa Water Plants’ primary source of water is the Iowa River. Alternate sources are a Cambrian-Ordovician Aquifer well and water purchased from Iowa City.

This water supply obtains water from one or more surface waters. Surface water sources are susceptible to sources of contamination within the drainage basin. Susceptibility is high.

This water supply obtains water from one or more groundwater aquifers. Every aquifer has a degree of susceptibility to contamination because of the characteristics of the aquifer, overlying materials, and human activity. Susceptibility to contamination generally increases with shallower aquifers, increasing permeability of the aquifer and overlying material, nearby development or agricultural activity, and poorly maintained wells. A detailed evaluation of your source water was completed by the Iowa Department of Natural Resources and is available from this water supply. Susceptibility is insignificant.

How to Read this Table

This report is based upon tests conducted in the year 2016 by the University of Iowa Water plant. Terms used in the Water-Quality Table and in other parts of this report are defined here.

Maximum Contaminant Level or MCL: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.

Maximum Contaminant level Goal or MCLG: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Required Additional Health Information

To ensure that tap water is safe to drink, EPA prescribes limits on the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency’s Safe Drinking Water Hotline at (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

(A) Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

(B) Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

(C) Pesticides and herbicides, which may come from a variety of sources such as agriculture, storm water runoff, and residential uses.

(D) Organic chemical contaminants, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff and septic systems.

(E) Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

(F) If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and building plumbing. University Water System is responsible for providing high quality drinking water, but cannot control the variety of material used in plumbing components. When your water has been sitting for several hours you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using the water for drinking or cooking. If you are concerned about lead in your water, you may wish to your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Some people may be more vulnerable to contaminants in drinking water than is the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium are available from the Safe Drinking Water Hotline (800-426-4791).

Concerning Nitrate in Our Water

Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant you should ask advice from your health care provider.
<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Date</th>
<th>Unit</th>
<th>MCL</th>
<th>MCLG</th>
<th>Detected Level</th>
<th>Range</th>
<th>Major Sources</th>
<th>Violation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic Compounds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>2016</td>
<td>ppb</td>
<td>AL=15</td>
<td>0</td>
<td>0.00</td>
<td>ND-2</td>
<td>Corrosion of household plumbing systems; Erosion of natural deposits.</td>
<td>NO</td>
</tr>
<tr>
<td>Copper</td>
<td>2016</td>
<td>ppm</td>
<td>AL=1.3</td>
<td>1.3</td>
<td>0.06</td>
<td>ND-12</td>
<td>Corrosion of household plumbing systems; Erosion of natural deposits.</td>
<td>NO</td>
</tr>
<tr>
<td>Nitrate</td>
<td>2016</td>
<td>ppm</td>
<td>10</td>
<td>10</td>
<td>9.0</td>
<td>5.1-9.0</td>
<td>Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.</td>
<td>NO</td>
</tr>
<tr>
<td>Turbidity</td>
<td>2016</td>
<td>ppm</td>
<td>AL=.3</td>
<td>AL=.3</td>
<td>0.28</td>
<td>0.04-0.28</td>
<td>Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.</td>
<td>NO</td>
</tr>
<tr>
<td>Fluoride</td>
<td>2016</td>
<td>ppm</td>
<td>4</td>
<td>4</td>
<td>0.55</td>
<td>0.55-0.80</td>
<td>Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.</td>
<td>NO</td>
</tr>
<tr>
<td>Sodium</td>
<td>04/03/2016</td>
<td>ppm</td>
<td>N/A</td>
<td>N/A</td>
<td>38</td>
<td>N/A</td>
<td>Erosion of natural deposits</td>
<td>NO</td>
</tr>
<tr>
<td>Microbiological Contaminants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Coliform</td>
<td>2016</td>
<td>samples</td>
<td>5%</td>
<td>0</td>
<td>1 positive</td>
<td>N/A</td>
<td>Naturally present in the environment</td>
<td>NO</td>
</tr>
<tr>
<td>Synthetic Organic Contaminants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atrazine</td>
<td>07/22/2015</td>
<td>ppb</td>
<td>3</td>
<td>3</td>
<td>.0002</td>
<td>N/A</td>
<td>Runoff from herbicide used on row crops</td>
<td>NO</td>
</tr>
<tr>
<td>Total Organic Carbon</td>
<td>2015</td>
<td>mg/l</td>
<td>N/A</td>
<td>N/A</td>
<td>3.3</td>
<td>1.07-4.38</td>
<td></td>
<td>NO</td>
</tr>
</tbody>
</table>

**Key to Table**

AL = Action Level  
MCL = Maximum Contaminant Level  
MCLG = Maximum Contaminant Level Goal  
ppm = parts per million, or milligrams per liter (mg/l)  
ppb = parts per billion, or micrograms per liter (ug/l)  
N/A = not available  

*OUR WATER SYSTEM VIOLATED A DRINKING WATER STANDARD OVER THE PAST YEAR. EVEN THOUGH THESE WERE NOT EMERGENCIES AS OUR CUSTOMERS, YOU HAVE A RIGHT TO KNOW WHAT HAPPENED AND WHAT WE DID TO CORRECT THESE SITUATIONS.*

We, the University Water System, are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards. During January of 2014 we did not submit monitoring results as required. All tests and results were performed at the University of Iowa Water Lab as required. The results were not properly submitted in our Monthly Quality Report (MRQ) and there were no violations of the MCL. The quality of the drinking water was not at risk during this time.

What should I do? There is nothing you need to do at this time.

What happened? What is being done?

A change in the interpretation of the reporting results resulted in an error. The procedure for completing the MRQ has been changed to prevent this problem from occurring again.

For more information, please contact Scott Beattie at 319-335-5483.
Water Operation, Customer Service and Distribution Staff
Thank you

• Questions

• Comments
Fluoride experiences...
Drinking Water Quality Issues

• Risk Communication – Bleiker Life Preserver

  – 1. There is a problem or opportunity that has to be addressed.
  – 2. You are the right entity to address it. In fact it would be irresponsible for you not to address it.
  – 3. The way you are addressing it is reasonable, responsible, and sensible.
  – 4. You are listening and care about the costs, effects, and possible hardships your actions will cause.
Dr. Sandman’s contention is that Risk = Hazard + Outrage

Components of Outrage

Voluntary vs. coerced
Natural vs. industrial
Familiar vs. not familiar
Not memorable vs. memorable
Not dreaded vs. dreaded
Chronic vs. catastrophic
Knowable vs. unknowable
Individually controlled vs. controlled by others
Fair vs. unfair
Morally irrelevant vs. morally relevant
Trustworthy sources vs. untrustworthy sources
Responsive process vs. unresponsive process
A survey published recently in JAMA Internal Medicine reveals that nearly one-half of Americans believe in at least one medical conspiracy theory.\(^1\) Eighteen percent believe three or more medical conspiracies including that vaccinations cause autism, that the FDA is preventing the release of a known cancer cure because of pressure from the pharmaceutical industry and that public water fluoridation is a way for industry to dump toxic waste into the environment.

It is vital not to view conspiracy believers as simply uninformed. The authors of the JAMA Internal Medicine study argue that conspiracy theory believers are not a “delusional fringe of paranoid cranks,” but that conspiratorial thinking, or ideation, is relatively common, and that “[r]ather than viewing medical conspiracies as indicative of a psychopathological condition, we can recognize that most individuals who endorse these narratives are otherwise ‘normal.’” In other words, it is important not to dismiss conspiracy theories as the lunatic beliefs of only a handful of people—they are us, and they are our patients.

Conspiracy belief is not due to a general level of distrust or paranoia, nor is adherence to one particular ideology likely to produce more (or less) conspiratorial thinking; rather, conspiracy thinking is more a matter of a “cognitive style” marked by particular attributes, which it is critical to recognize.
Conspiracy Ideation
JAMA Internal Medicine Survey Results

• Eighteen percent believe three or more medical conspiracies, including:
  – Vaccinations cause autism
  – The FDA is preventing the release of a known cancer cure because of pressure from the pharmaceutical industry, and
  – Public water fluoridation is a way for industry to dump toxic waste into the environment
Atrazine Concentration

- River
- Finished

PPB

Numbers: 38776, 38846, 38888, 38930, 38972, 39049