

# Bottled Drinking Water



## Laboratory Analysis R E P O R T

Fiscal Year 2008



## Introduction

Wisconsin State Statute, s. 97.34(2)(e), requires the Department of Agriculture, Trade and Consumer Protection to compile and publish an annual bottled drinking water report. It is a compilation of the laboratory results for bottled drinking water sampled in the State of Wisconsin in Fiscal Year 2008. The samples were collected from bottled water processors and retail distribution sites in this state. The collection and analysis is a coordinated effort by the Bureau of Food Safety and Inspection, the Bureau of Laboratory Services Groundwater Unit and the Wisconsin Laboratory of Hygiene.

There are approximately 30 bottled drinking water processors in the State of Wisconsin. They are licensed under the category "Food Processing Plant" by the Department of Agriculture Trade and Consumer Protection and are required to comply with the same quality and safety standards as municipal water systems. They are licensed and regulated under Wisconsin Administrative Codes:

- Chapter ATCP 70 – "Food Processing Plants"
- Chapter NR 809 - "Safe Drinking Water"
- Section NR 140.10 - "Groundwater Quality"

To provide reasonable assurance of compliance with state health-related standards, bottling establishments have specific requirements for product sampling, analysis, record keeping, and reporting. They test for bacteria each month, nitrates every quarter, volatile organics, pesticides, and inorganics every third year, and radionuclide every five years. The processor maintains the results of microbiological analysis for a year, chemical analysis for six years, and radiological analysis for ten years.

In the state fiscal year ending June 30, 2008, twelve commercial bottled water samples from twelve licensed establishments were collected and analyzed. These samples included water from both private wells and municipal water sources. The samples were analyzed for up to 26 possible substances that cause either aesthetic defects or are contaminants of public health concern. The substances and their regulatory limits are included in the Enforcement Standards tables starting on page 10.

All 2008 samples met current public health enforcement standards (s. NR 140.10, Wis. Adm. Code).

The results of the 2008 representative sampling and analysis of bottled drinking water indicated that bottled drinking water products produced and sold in Wisconsin met the health-related enforcement standards and all of the aesthetic quality standards set by the State of Wisconsin.

## *Background*

There is no such thing as naturally pure water. In nature, all water contains some impurities. As water flows in streams, accumulates in lakes, and filters through layers of soil and rock in the ground, it dissolves or absorbs many of the substances that it touches. Some of these substances are harmless. In fact, some people prefer mineral water precisely because minerals give it an appealing taste. However, at certain levels, just like man-made chemicals, minerals may be considered contaminants that can make water unpalatable or even unsafe.

## *Man-made Contaminants*

Man-made contaminants may also affect water that is bottled. These contaminants may be substances discharged from factories, applied to farmlands, or used by consumers in their homes and yards. Microbiological and chemical contaminants can enter water supplies. These materials can be the result of human activity or can be found in nature. For instance, chemicals can migrate from disposal sites and contaminate sources of drinking water. Coliform bacteria from human and animal wastes may be found in drinking water if the water is not properly treated or disinfected. These bacteria are used as indicators that other harmful organisms may be in the water. If coliform bacteria are found in a water sample, further testing is conducted to see if there are any fecal or pathogenic bacteria present.

Water naturally contains less than 1 milligram of nitrate-nitrogen per liter. When higher levels are present, it indicates that the water has been contaminated. Common sources of nitrate contamination include fertilizers, animal wastes, septic tanks, municipal sewage treatment systems, and decaying plant debris. State and federal laws set the maximum allowable level of nitrate-nitrogen in public drinking water at 10 milligrams per liter.

### *Natural Contaminants*

Naturally occurring contaminants can also be found in drinking water. Some contaminants come from erosion of natural rock formations. Groundwater, that moves slowly through the pores or cracks in underground layers of rock, dissolves minerals as it travels. Dissolved solids are minerals or salts that have been dissolved in the water while in the aquifer. Dissolved solids can be calcium, magnesium, salt, iron or other minerals. Some of these dissolved solids may actually come out of solution during storage if the water becomes cold enough or if some of the water evaporates. These precipitates are not harmful, but may not be appealing to the consuming public.

Fluoride can be added to water supplies to promote healthy teeth. It can also be present in water from the erosion of natural deposits or discharge from fertilizer and aluminum factories.

Water can also pick up naturally occurring radium or man-made radionuclide as it flows to the water source. The radioactive gas radon-222 occurs in certain types of rock and can leach into ground water. Most rock contains some radium, usually in small amounts. Testing for radionuclide is a relatively recent change in DATCP requirements. The testing process for water samples begins with a screening for "gross alpha/beta particle activity" which measures the total amount of one type of radioactivity given off by the water. If high levels of gross alpha/beta activity are found, further testing for radium is conducted. Radioactivity levels are measured in "pico curies" per liter of water (abbreviated "pCi/L").

In Wisconsin, most of the community water supplies which exceed the radium standard draw water from a deep sandstone aquifer and are located in a narrow band which stretches from Green Bay to the Illinois state line. In addition, a few high radium levels have been found in groundwater from sandstone formations in west central Wisconsin and in granite formations in north central Wisconsin. In all cases, the radium was present in the rock and water long before the first well was drilled.

### *Bottled Water Regulation*

On May 13, 1996 new bottled water regulations from FDA took effect. The new regulations were aimed at alleviating consumer confusion about the many different types of bottled water on the market by providing standard definitions for the terms "artesian water," "ground water," "mineral water," "purified water," "sparkling bottled water," "spring water," "sterile water," "well water," and others.

Bottled water, like all other foods regulated by FDA, must be processed, packaged, shipped and stored in a safe and sanitary manner and be truthfully and accurately labeled. Bottled water products must also meet specific FDA quality standards for contaminants. Since 1996, mineral water must also meet the bottled water standards. Mineral water had previously been exempt from standards that applied to other bottled water. FDA web site: [www.fda.gov](http://www.fda.gov).

### *FDA has established the following definitions:*

**Bottled Water:** Water that is intended for human consumption and that is sealed in bottles or other containers with no added ingredients except that it may contain safe and suitable antimicrobial agents.

**Artesian Water or Artesian Well Water:** Water from a well tapping a confined aquifer in which the water level stands at some height above the top of the aquifer.

**Ground Water:** Water from a subsurface saturated zone that is under a pressure equal to or greater than atmospheric pressure.





Mineral Water: Water containing not less than 250 parts per million total dissolved solids, originating from an underground water source. No minerals may be added to this water.

Purified Water: Water that is produced by distillation, deionization, reverse osmosis or other suitable processes and that meets the definition of "purified water" in the U.S.

Pharmacopeia, 23d Revision, January 1, 1995.

Sparkling Bottled Water: Water that, after treatment and possible replacement of carbon dioxide, contains the same amount of carbon dioxide that it had at emergence from the source.

Spring Water: Water derived from an underground formation from which water flows naturally to the surface of the earth.

Well Water: Water from a hole bored, drilled, or otherwise constructed in the ground, which taps the water of an aquifer.

In addition to defining these terms, the regulation addresses various other labeling concerns. For example, water bottled from municipal water supplies must be clearly labeled as "from a community water system" or, alternatively, "from a municipal source", unless it is processed sufficiently to be labeled as "distilled" or "purified" water.

The regulation also requires accurate labeling of bottled water marketed for infants. If a product is labeled "sterile" it must be processed to meet FDA's requirements for commercial sterility. Otherwise, the labeling must indicate that it is not sterile and should be used in preparation of infant formula only as directed by a physician or according to infant formula preparation instructions.

## Summary of Results FY 2008

### *Enforcement Standards for Safety*

None of the twelve samples tested positive for coliform bacteria.

- One of twelve samples tested positive for a pesticide, however were well below enforcement standards.
- Five of twelve samples contained n-nitrate/nitrites at levels above sensitivity but well within the acceptable standards. The enforcement level for n-nitrate/nitrites is 10 mg/l.
- Two of twelve samples had small amounts of radionuclide activity. All of the results were well below the regulatory limit.

Contaminants	Number Positive	Percent Positive	Average Value of Positive Results	Enforcement Level	Percent of Regulatory Limit
N-nitrate/nitrite	5	41.66%	2.13 mg/L	10.0 mg/L	21.32%
Coliform Bacteria	0	0%	0.00	1.1 MPN/L	0.00%
Pesticides	1	8.3%	<0.50 µg/L	3.0 µg/L	<10.0%
Radionuclide's					
Gross Alpha	2	16.66%	1.5 pCi/L	15.0 pCi/L	10%
Gross Beta	2	16.66%	1.3 pCi/L	50.0 pCi/L	2.6%

### *Quality and Aesthetic Standards*

Analyses were conducted for secondary inorganic and physical standards (s. NR 809.60, Wis. Adm. Code). These address the aesthetic quality of drinking water such as taste, odor and appearance.

- All samples were below the enforcement standards.
- Ten samples contained some level of chlorides, four samples contained fluoride, none contained detectable levels of zinc, none contained detectable levels of copper and four contained sulfates. All detectable levels were well below enforcement standards.
- Low levels of dissolved solids were detected in ten of twelve samples.
- No samples tested above the enforcement level for total dissolved solids standards. There are no adverse health affects from dissolved solids providing that the sulfate level is also low. Since the level of sulfates was low in this sample, there is no cause for concern. At the most, the dissolved solids could cause an off flavor. Quality and Aesthetic Standards Table

Contaminants	Number Positive	Percent Positive	Average Value of Positive Results	Enforcement Level	Percent of Regulatory Limit
Chloride	10	83.3%	18.76 mg/L	250.0 mg/L	7.5%
Fluoride	4	30%	0.767mg/L	2.0 mg/L	38.3%
Zinc	0	0%	0 µg/L	5.0 mg/L	0%
Dissolved Solids	10	83.3%	216.2 mg/L	500.0 mg/L	43.2%
Sulfates	4	50%	43.12 mg/	250.0 mg/L	17.25%
Copper	0	0.00%	.000 mg/L	1.3 mg/L	0%





## Public Health Groundwater Quality Standards and Test Sensitivities<sup>1</sup>

Items noted with an \* were not detected in any of the samples

Test	Enforcement Standard	Test Sensitivity
Coliform	No Presence	1.10 MPN/100 mL
Simazine *	4.0 µg/L	0.15 µg/L
Carbofuran *	40.0 µg/L	0.50 µg/L
Lead *	15.0 µg/L	0.50 µg/L
Cyanides *	200.0 µg/L	10.0 µg/L
Endrin *	2.0 µg/L	0.50 µg/L
Lindane *	0.2 µg/L	0.50 µg/L
Toxaphene *	3.0 µg/L	1.0 µg/L
Methoxychlor *	40.0 µg/L	0.50 µg/L
2,4-D *	70.0 µg/L	0.20 µg/L
2,4,5-TP*	50.0 µg/L	0.20 µg/L
Silvex *	50.0 µg/L	0.05 µg/L
N-Nitrate/Nitrite	10.0 mg/L	0.50 mg/L
Atrazine *	3.0 µg/L	0.15 µg/L
Deethyl atrazine *	3.0 µg/L	0.30 µg/L
Deisopropylatrazine *	3.0 µg/L	0.30 µg/L
Diamino Atrazine *	3.0 µg/L	0.50 µg/L
Gross Alpha	15.0 pCi/L	3.0 pCi/L
Gross Beta	50.0 pCi/L	3.0 pCi/L

## Secondary Chemical & Physical Standards<sup>2</sup>

Test	Enforcement Standard	Test Sensitivity
Dissolved Solids	500.0 mg/L	10 mg/L
Chlorides	250.0 mg/L	2.0 mg/L
Copper	1.3 mg/L	20 µg/L
Fluoride	4.0 mg/L	0.20 mg/L
Iron	0.3 mg/L	50 mg/L
Sulfates	250.0 mg/L	10 mg/L
Zinc	5.0 mg/L	10 µg/L
Arsenic <sup>3</sup>	10 µg/L	1 µg/L

mg/L = Milligrams per Liter

ug/L = Micrograms per Liter

MPN/100mL = Most Probable Number in 100 milliliters

pCi/L = picocuries/liter of water

<sup>1</sup>From NR 140 Register, April 2001 & From NR 809 Register, December 2000

<sup>2</sup>Aesthetic Standard from NR 809.60 Register, December 2000

<sup>3</sup>Maximum Contaminant Level (MCL) for Arsenic enforceable after Jan. 23, 2006. Arsenic was found in three of the ten samples, but at levels well below the enforcement level that took effect in 2006.

## Some Informational Web sites:

### *EPA*

- <http://www.epa.gov/safewater/dwhealth.html>  
" [Drinking Water and Health](#) "
- <http://www.epa.gov/safewater/dwh/contams.html>  
" [Information About Water Contaminants](#) "
- <http://www.epa.gov/OGWDW>  
" [The Office of Ground Water and Drinking Water](#) "

### *Wisconsin*

- The Wisconsin [DNR Drinking Water and Ground Water web site](#)
- Wisconsin Department of Agriculture,  
Trade & Consumer Protection rule web site  
[Chapter 97 Food Regulation](#)



Summary Tables Fiscal Year 2008

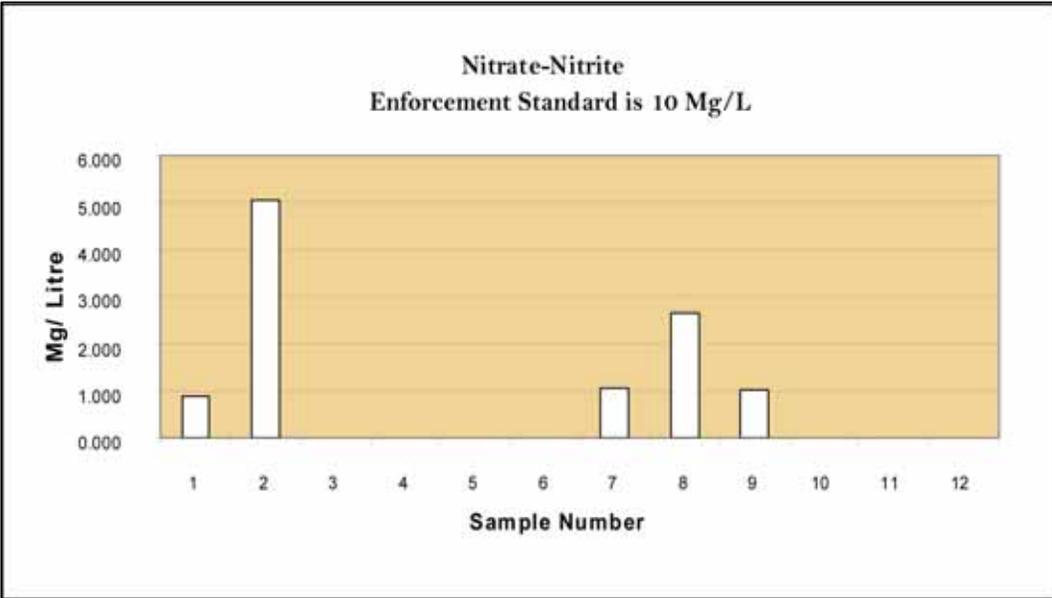
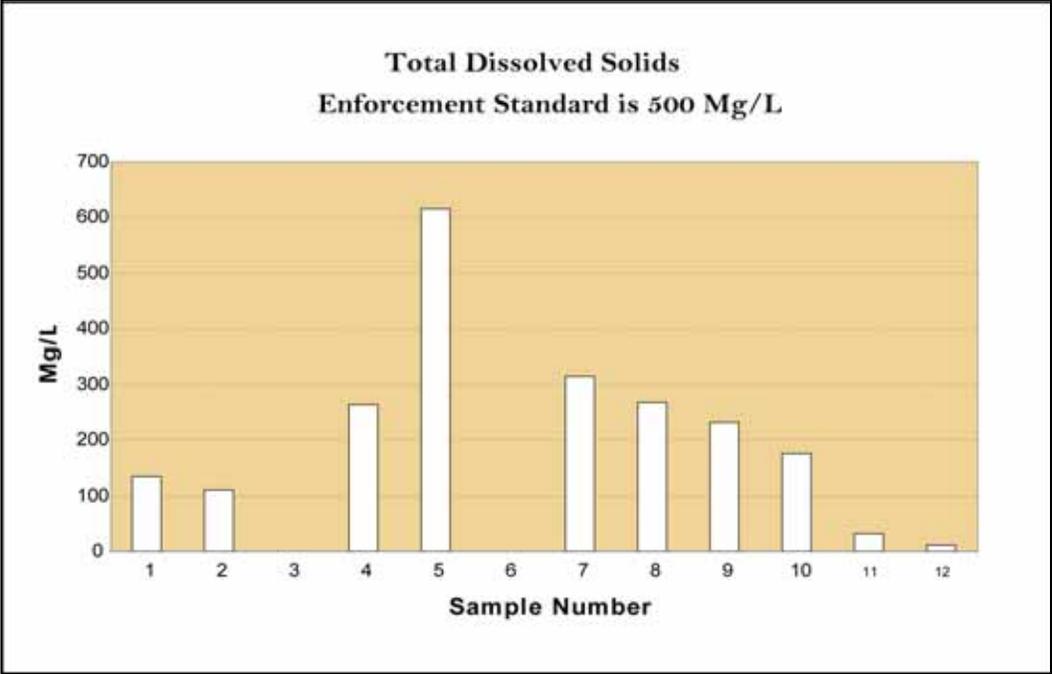
Producer		Jade Spring Artesian Water LLC	Premium Waters, Inc.	Roundy's Supermarkets, Inc	Artesian Wells, Inc
Lic. #		122564-F2	121884-F2	198123-F2	121536-F2
Location		Osseo	Chippewa Falls	Kenosha	Plymouth
Sample Number		1	2	3	4
Gallons Sampled		2 gallon	2 gallon	2 gallon	2 gallon
Sample Date		Fiscal Year 2008	Fiscal Year 2008	Fiscal Year 2008	Fiscal Year 2008
Test					
Endrin	µg/L	<0.50	<0.50	<0.50	<0.50
Fluoride	mg/L	<0.20	<.20	<.20	<.20
Iron	µg/L	101	55.8	<50	120
Lead	µg/L	<0.5	<0.5	<0.5	<0.5
Lindane	µg/L	<0.50	<0.50	<0.50	<0.50
Methoxychlor	µg/L	<0.50	<0.50	<0.50	<0.50
Nitrogen -	mg/L	0.88	5.05	<0.50	<0.50
Atrazine	µg/L	<0.15	<0.15	<0.15	<0.15
2,4,5-TP	µg/L	<0.20	<0.20	<0.20	<0.20
Simazine (Princep)	µg/L	<0.15	<0.15	<0.15	<0.15
Sulfates	mg/L	14.4	<10	<10	<10
Toxaphene	µg/L	<1.0	<1.0	<1.0	<1.0
Zinc	µg/L	<10	<10	<10	<10
Carbofuran (Furadan)	µg/L	<1.0	<1.0	<1.0	<1.0
Chlorides	mg/L	3.40	17	<2.0	5.10
Copper	µg/L	<20	<20	<20	<20
Cyanide	µg/L	<10	<10	<10	<10
De-ethyl Atrazine	µg/L	<0.30	Detected between MDL 0.0582 ug/L and LOQ 0.30 ug/L	<0.30	<0.30
De-isopropyl atrazine	µg/L	<0.30	<0.30	<0.30	<0.30
Di-amino atrazine	µg/L	<0.50	<0.50	<0.50	<0.50
2,4-D	µg/L	<0.20	<0.20	<0.20	<0.20
Total Dissolved Solids	mg/L	136	110	<10	264
Arsenic	µg/L	<1.5	<1.5	<1.5	2.45
Coliform	/100 mL	None found	<1	<1	<1
E. Coli	/100 mL	0	0	0	0
Gross alpha	pCi/l	Value<test sensitivity	Value<test sensitivity	Value<test sensitivity	Value<test sensitivity
Gross beta	pCi/l	Value<test sensitivity	Value<test sensitivity	Value<test sensitivity	Value<test sensitivity

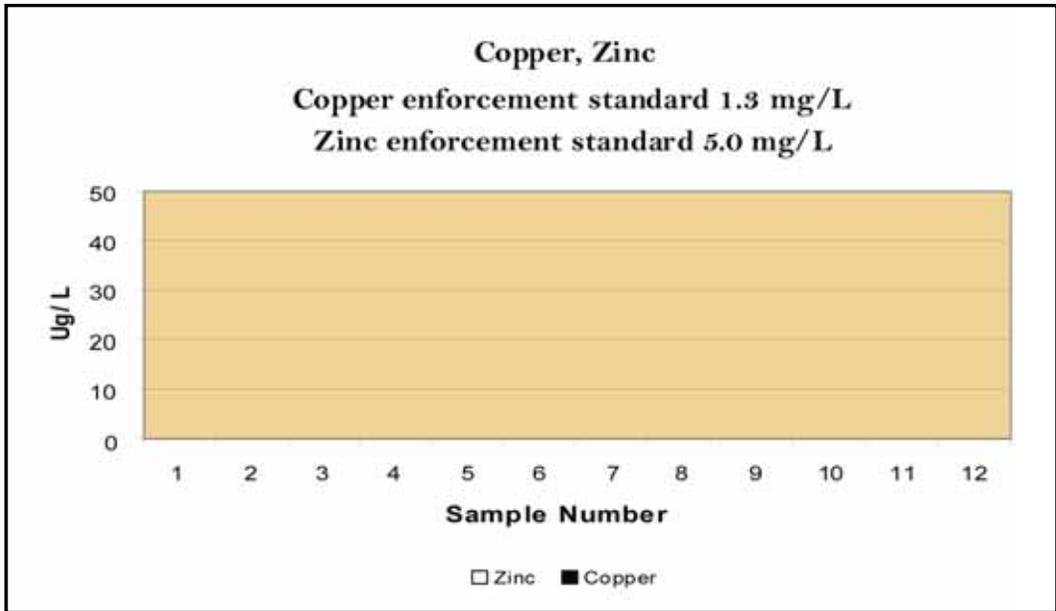
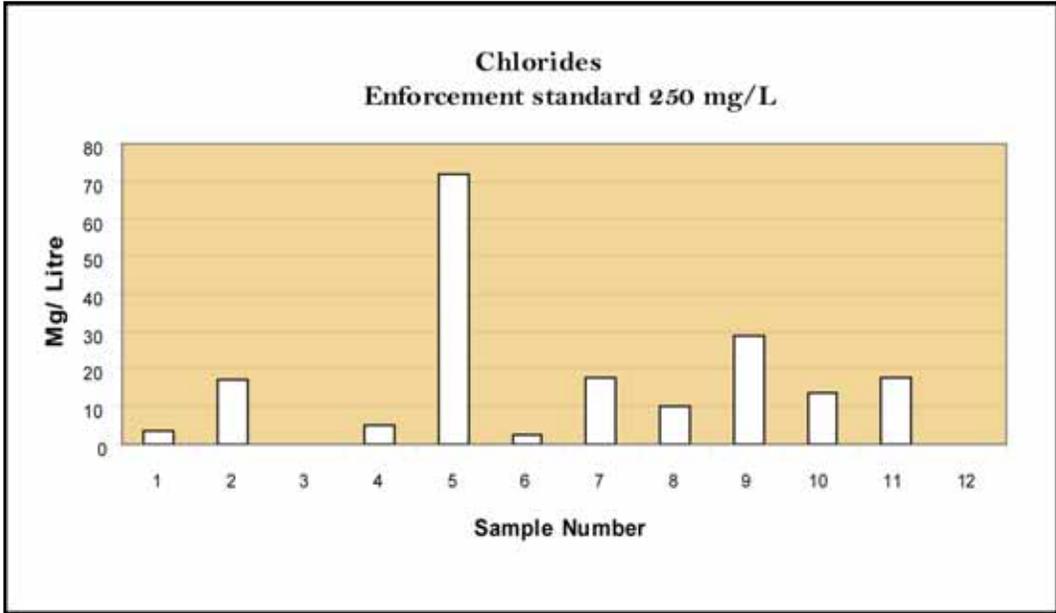
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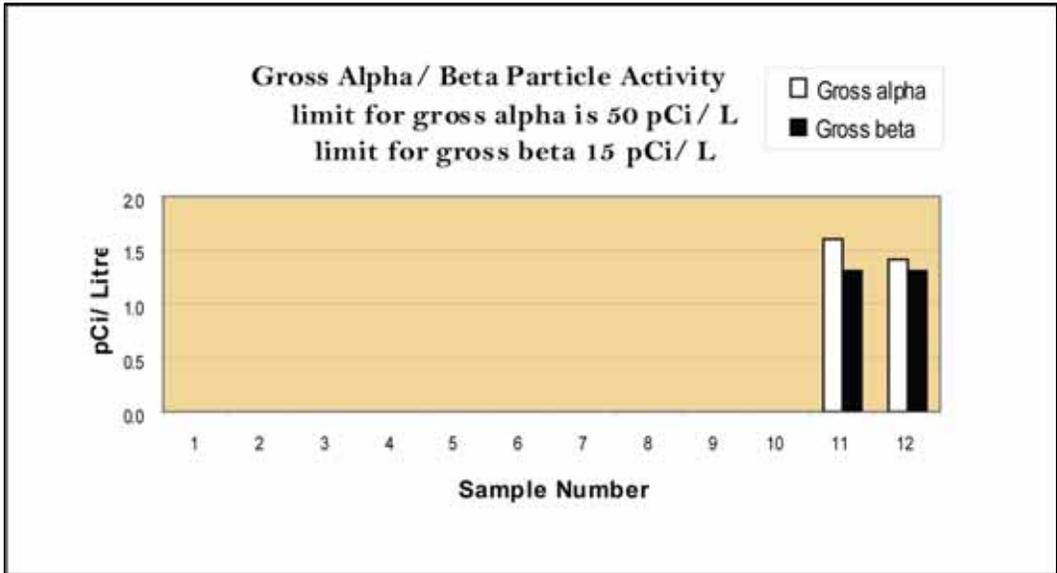
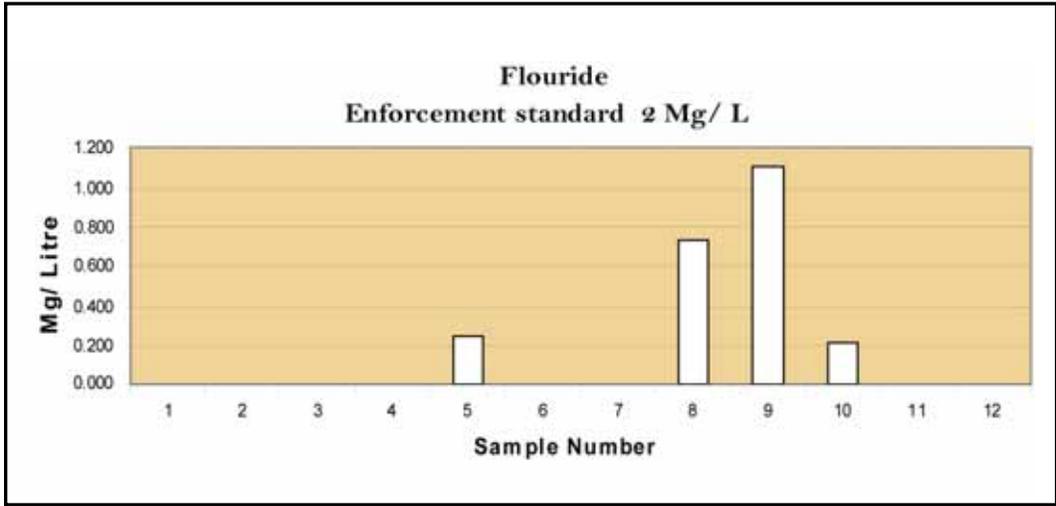
Producer		Mineral Spring Water Co.	Kwik Trip Dairy	Buffalo Dons Artesian Wells Ltd.	Woodman's Food Market Inc.
Lic. #		121605-F2	55-65	121506-F2	125046-FA
Location		Oshkosh	La Crosse	Mishicot	Madison
Sample Number		5	6	7	8
Gallons Sampled		2 gallon	2 gallon	2 gallon	2 gallon
Sample Date		Fiscal Year 2008	Fiscal Year 2008	Fiscal Year 2008	Fiscal Year 2008
<b>Test</b>					
Endrin	µg/L	<0.50	<0.50	<0.50	<0.50
Fluoride	mg/L	0.255	<0.20	<.20	0.730
Iron	µg/L	215	<50	149	157
Lead	µg/L	<0.5	<0.50	<0.5	<0.5
Lindane	µg/L	<0.50	<0.50	<0.50	<0.50
Methoxychlor	µg/L	<0.50	<0.50	<0.50	<0.50
Nitrogen -	mg/L	<0.50	<0.50	1.04	2.67
Atrazine	µg/L	<0.15	<0.15	<0.15	<0.15
2,4,5-TP	µg/L	<0.20	<0.20	<0.20	<0.20
Simazine (Princep)	µg/L	<0.15	<0.15	<0.15	<0.15
Sulfates	mg/L	102	<10	44.8	<10
Toxaphene	µg/L	<1.0	<1.0	<1.0	<1.0
Zinc	µg/L	<10	<10	<10	<10
Carbofuran (Furadan)	µg/L	<1.0	<1.0	<1.0	<1.0
Chlorides	mg/L	72.1	2.43	17.7	9.96
Copper	µg/L	<20	<20	<20	<20
Cyanide	µg/L	<10	<10	<10	<10
De-ethyl Atrazine	µg/L	<0.30	<0.30	<0.30	0.315
De-isopropyl atrazine	µg/L	<0.30	<0.30	<0.30	<0.30
Di-amino atrazine	µg/L	<0.50	<0.50	<0.50	<0.50
2,4-D	µg/L	<0.20	<0.20	<0.20	<0.20
Total Dissolved Solids	mg/L	616	<10	316	268
Arsenic	µg/L	<1.5	<1.5	<1.5	<1.5
Coliform	/100 mL	<1	<1	<1	<1
E. Coli	/100 mL	0	0	0	0
Gross alpha	pCi/L				
Gross beta	pCi/L				

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Producer		La Crosse Premium Water	Wabeno Sanitary District 1	Culligan Water	The Water Store
Lic. #		122023-F2	197290-F2	122107-F2	190068-F1
Location		La Crosse	Wabeno	Rothschild	Wind Lake
Sample Number		9	10	11	12
Gallons Sampled		2 gallon	2 gallon	2 gallon	2 gallon
Sample Date		Fiscal Year 2008	Fiscal Year 2008	Fiscal Year 2008	Fiscal Year 2008
Test					
Endrin	µg/L	<0.50	<0.50	<0.50	<0.50
Fluoride	mg/L	1.10	0.218	<.20	<0.20
Iron	µg/L	127	82.7	<50	<50
Lead	µg/L	<0.5	<0.5	<0.5	<0.5
Lindane	µg/L	<0.50	<0.50	<0.50	<0.50
Methoxychlor	µg/L	<0.50	<0.50	<0.50	<0.50
Nitrogen - Nitrate/Nitrite	mg/L	1.02	<0.50	<0.50	<0.50
Atrazine	µg/L	<0.15	<0.15	<0.15	<0.15
2,4,5-TP	µg/L	<0.20	<0.20	<0.20	<0.20
Simazine (Princep)	µg/L	<0.15	<0.15	<0.15	<0.15
Sulfates	mg/L	11.3	<10	<10	<10
Toxaphene	µg/L	<1.0	<1.0	<1.0	<1.0
Zinc	µg/L	<10	<10	<10	<10
Carbofuran (Furadan)	µg/L	<1.0	<1.0	<1.0	<1.0
Chlorides	mg/L	28.9	13.6	17.5	<2.0
Copper	µg/L	<20	<20	<20	<20
Cyanide	µg/L	<10	<10	<10	<10
De-ethyl Atrazine	µg/L	<0.30	<0.30	<0.30	<0.30
De-isopropyl atrazine	µg/L	<0.30	<0.30	<0.30	<0.30
Di-amino atrazine	µg/L	<0.50	<0.50	<0.50	<0.50
2,4-D	µg/L	<0.20	<0.20	<0.20	<0.20
Total Dissolved Solids	µg/L	232	176	32	12.0
Arsenic	mg/L	<1.5	3.70	<1.5	3.70
Coliform	µg/L	<1	<1.0	<1.0	<1.0
E. Coli	/100 mL	0	0	0	0
Gross alpha	pCi/L			-0.4+/-0.9(MDL=1.6)	0.4+/- (MDL=1.4)
Gross beta	pCi/L			1.8+/-0.9 9MDL=1.3)	-0.3+/-0.7(MDL=1.3)







Enforcement Standards: 15 pCi/L for Alpha ( $\alpha$ ),  
50 pCi/L for Beta ( $\beta$ ) Particle emissions