

In the February 15, 2008 issue of the Water Quality update:

- Well Status Report
- Water Quality Test Results – December 2007 & January 2008
- Well 29 Extended Period Deep Well Pump Test Update
- Ongoing Virus Study Update
- Subscribe to the Drinking Water Quality Listserv

Well Status Report

Except for Unit Well 28, all seasonal wells (6, 8, 10, 17, 27, & 29) are currently shutdown for the winter. Seasonal wells typically operate from April to October when demand for water is higher due to outdoor water use. In a previous Water Quality update, it had been reported that Well 28 would operate through December while maintenance work at Well 26 was completed. Well 28 was briefly taken out of service in January following repairs to Well 26; however, additional work at Well 26 necessitated bringing Well 28 back into service earlier this month. Well 28 will remain in service throughout the remainder of the winter to help maintain reservoir water levels on the southwest side of Madison and to ensure adequate chlorine residuals at the extreme outer limits of the distribution system.

Water Quality Test Results – December 2007 & January 2008

MICROBIOLOGY – In December and January, the Water Utility collected 705 water samples from Water Utility facilities and representative sample locations in the water distribution system. These samples were tested for coliform bacteria – indicators of potential water contamination. No samples tested coliform-positive; all 705 samples collected in December and January were found to have no coliform bacteria present.

VOLATILE ORGANIC COMPOUNDS – The utility also collected samples from five wells and had the water tested for the presence of volatile organic compounds – man-made contaminants that may be present in groundwater. The water utility currently tests four wells (9, 15, 18, & 28) during each three-month period for 42 volatile organic compounds including tetrachloroethylene and carbon tetrachloride. Samples were also collected at three reservoirs (115, 215, & 229) in an effort to better understand distribution system water quality. The table shows the contaminants that were detected, maximum concentration found during this testing period, EPA's maximum contaminant level (MCL), and the contaminant concentration at each facility. ND means that the contaminant was not detected.

VOLATILE ORGANIC COMPOUNDS	MAXIMUM	UNITS	MCL	9	15	18	28	30	115	215	229
Bromodichloromethane*	1.0	ppb	--	0.40	ND	ND	ND	ND	0.57	0.57	1.0
Bromoform*	0.90	ppb	--	0.43	0.23	ND	ND	ND	0.90	0.84	0.72
Chloroform*	0.42	ppb	--	ND	ND	ND	ND	ND	ND	0.21	0.42
Dibromochloromethane*	1.4	ppb	--	0.73	0.25	[0.31] ¹	ND	ND	1.2	1.2	1.4
Total Trihalomethanes (TTHM)	3.5	ppb	80	1.56	0.48	0.31	ND	ND	2.7	2.8	3.5
Tetrachloroethylene	3.1	ppb	5	2.3	3.1	1.3	ND	ND	1.7	1.6	ND
Trichloroethylene	0.33	ppb	5	ND	0.33	[0.19]	ND	ND	0.21	ND	ND

* Disinfection By-Products (DBP)

¹ Bracketed numbers indicate that the contaminant was detected but measured below the Limit Of Quantitation (LOQ)

As the above table attests, Well 15 has the highest level of tetrachloroethylene of all Madison municipal wells. Low levels of the man-made contaminant have been detected at Well 15 since the early 1990's, and quarterly samples have been collected since 1996. Wells 9 and 18 are also sampled during each three-month period because of the level of tetrachloroethylene that has been found.

Additional information on tetrachloroethylene can be found at

http://www.epa.gov/safewater/contaminants/dw_contamfs/tetrachl.html

Bromodichloromethane, bromoform, chloroform, and dibromochloromethane are disinfection by-products – compounds that form when chlorine, added as a disinfectant, combines with the impurities in ground water. Because ground water has very little organic matter and low levels of chlorine are needed to kill bacteria and deactivate viruses, the concentrations of disinfection by-products are fairly low.

Well 29 Extended Period Deep Well Pump Test Update

In November, the Water Utility conducted a 21-day full capacity pump test at Unit Well 29. The purpose of the test was to further investigate groundwater movement and drawdown in the area under maximum pumping rates at the well. The consultants, Montgomery Associates and RMT, Inc., presented their findings and recommendations to the Water Utility Board on February 12.

Groundwater levels were continuously measured before, during, and after the pump test at six monitoring wells located in the vicinity of Sycamore Landfill. Groundwater modeling based on the results of the pump test suggests that at maximum pumping rates, or 2300 gallons per minute (gpm), the pumping may capture groundwater from the vicinity of Sycamore Landfill within a period of 15 years. Alternatively, if continuous pumping were maintained at a rate of 1100 gpm, it would probably not capture groundwater from the vicinity of the landfill. The consultants and three area hydrogeologists agree that the model results are very conservative.

The consultant's recommendations include: (1) pump the well at an average yearly rate of 1100 gpm or a maximum annual water withdrawal of 550 million gallons to avoid long-term impacts from the landfill, and (2) install a sentry well into the lower aquifer at a location between Well 29 and Sycamore Landfill to monitor water quality in a possible migration pathway from the landfill to the well. Monitoring at the sentry well would provide additional information about potential future water quality impacts at Well 29 due to the pumping and also serve as an early warning before the contaminants might reach the drinking water well. The attached link includes the technical memo that was prepared for the Water Utility.

(UW 29 Summary Memo Feb. 5, 2008 – See Attachment)

In response to these results, the Water Utility Board approved a recommendation from Water Utility staff to reduce the operational capacity of the filter at Well 29 from 2200 gpm to 1100 gpm.

Water quality samples were collected prior to shutting down the well at the conclusion of the pump test. Samples were analyzed for over 80 potential organic contaminants. None of the contaminants were detected in the samples. The following link lists all organic contaminants that were tested and the detection limit of each.

(VOC/SOC List – See Attachment)

Ongoing Virus Study – UW 7, UW 12, UW 13, UW 16, UW 19, & UW 30

Researchers from the Marshfield Clinic (Marshfield, WI), Wisconsin Geological and Natural History Survey (WGNHS), and the United States Geological Survey (USGS) are conducting an on-going investigation into the presence of human viruses in the lower sandstone aquifer from which Madison draws its drinking water. The research group initially tested eleven municipal wells for the presence of adenovirus, enterovirus, hepatitis A, norovirus (Genogroup I & II), and rotavirus. Test results show that in September six wells tested positive for adenovirus and one was positive for enterovirus. In October, four wells had evidence of adenovirus and enterovirus while a fifth was positive for enterovirus only.

Samples that tested positive had a concentration of less than 1 virus per liter, a level well below the infectious dose for healthy individuals. Mark Borchardt, lead researcher for the project, asserts ***there is no public health threat*** since chlorine disinfection is effective and sufficient to deactivate the viruses if they are in fact viable. All samples were collected from the groundwater wells prior to chlorination. Madison Water Utility utilizes chlorine to kill viruses and bacteria that may be present in groundwater and to protect against waterborne illness. To provide a margin of safety and also meet future federal groundwater rules, the Water Board approved an increase in the chlorine level at all Madison wells on June 19, 2007.

At the present time, the viability of these viruses is unknown. Molecular techniques (polymerase chain reaction [PCR] analysis), which test for the presence of viral genes, were used to determine the presence of viruses rather than cell culture methods. The researchers plan to perform cell culture studies later in their investigation to determine the viability of the viruses detected.

Following the initial results, the research group plans to collect and analyze monthly samples from a subset of six wells for continued monitoring that is expected to last about a year. Three wells (UW 7, UW 19, UW 30) are cased into the lower, confined aquifer while the other three wells (UW 12, UW 13, UW 16) are not cased through the Eau Claire shale and are referred to as multi-aquifer wells. The Eau Claire shale is a layer of sedimentary rock that separates the upper from the lower aquifer. Newer municipal wells are cased through the shale layer and draw water essentially exclusively from the lower aquifer. When present, the Eau Claire shale is thought to protect the lower aquifer from surface activities that can contaminate groundwater.

Below are the test results for the six wells currently under investigation. A negative result means that none of the six types of viruses was detected. The most recent round of testing, conducted in December and January, shows viruses were detected at two of three confined-aquifer wells and one of three multi-aquifer wells.

	Confined Aquifer Wells			Multi-Aquifer Wells		
	UW 7	UW 19	UW 30	UW 12	UW 13	UW 16
2007						
September	A	A	Negative	A	A, E	A
October	A, E	Negative	Negative	A, E	Negative	Negative
November	ns	A, E	Negative	A	Negative	Negative
December	ns	ns	ns	ns	ns	Negative
2008						
January	E	A	Negative	A	Negative	ns
February						
March						
May						
June						
July						
August						

A = adenovirus, E = enterovirus, H = hepatitis A, N-I = norovirus, genogroup I, N-II = norovirus, genogroup II, R = rotavirus
 ns – no sample was collected

Subscribe to the Drinking Water Quality Listserv

People who want to receive regular updates on Madison's drinking water quality can subscribe to this Listserv at:

<http://lavos.wiscnet.net/mailman/listinfo/drinkingwaterquality>

Sincerely,
 Joseph Grande
 Water Quality Manager
 Madison Water Utility
 266-4654