

September 22, 2015

Mr. Tauren Beggs
Hydrogeologist
Wisconsin Department of Natural Resources
2984 Shawano Avenue
Green Bay WI 54313-6727

Subject: **2015 to 2016 Semi-Annual Potable Well Monitoring Work Plan
Former Town of Newton Gravel Pit, 3130 Hecker Road, Manitowoc, Wisconsin
WDNR BRRTS No. 02-36-000268
WDNR FID No. 436104020**

Dear Mr. Beggs:

On behalf of the City of Manitowoc (City), AECOM is providing a potable well monitoring work plan for continued monitoring of private wells near the Former Town of Newton Gravel Pit (Site). The purpose of the monitoring is to continue to evaluate the extent of cis-1,2-dichloroethene and vinyl chloride as contaminants of concern on a semi-annual basis over the course of a one and a half year time period. These additional data and sampling efforts are in response to requests from the Wisconsin Department of Natural Resources (WDNR).

Presented below are background information, a proposed sampling schedule, sampling methods, reporting, and a summary of ongoing activities related to the potable well sampling.

Background Information

Previous work and data on the potable well sampling can be found in the 2013-2014 Potable Well Monitoring Letter Report¹ and the 2014 First, Second, and Third Quarterly Potable Well Monitoring Letter Report^{2,3,4}, as well as the 2015 Fourth Quarterly Potable Well Monitoring Letter Report⁵.

The fourth quarterly potable well sampling event was the last event following the sampling schedule presented in the Potable Well Sampling Plan. The Sampling Plan grouped the potable wells into the following categories:

- Target Zone Wells – wells with detectable contaminants of concern (COCs) or wells bounded by impacted wells.
- Replacement Wells – wells that were replaced due to enforcement standard exceedances of the COCs.
- Sentinel Zone Wells – wells outside and adjacent to the Target Zone that do not have detectable COCs.
- Data Gap Wells – wells not previously sampled.
- Upgradient and Historically Sampled Wells – wells outside the Sentinel Zone that have been sampled in the past but are not currently scheduled to be sampled.

¹ 2013-2014 Potable Well Monitoring Letter Report Former Town of Newton Gravel Pit, BRRTS No. 02-36-000268, AECOM Project No: 60135471(82518), August 15, 2014.

² 2014 First Quarterly Potable Well Monitoring Letter Report, Former Newton Gravel Pit, BRRTS No. 02-36-000268, AECOM Project No: 60135471(82518), November 28, 2014.

³ 2014 Second Quarterly Potable Well Monitoring Letter Report, Former Newton Gravel Pit, BRRTS No. 02-36-000268, AECOM Project No: 60135471 (82518), December 2, 2014

⁴ 2014 Third Quarterly Potable Well Monitoring Letter Report, Former Newton Gravel Pit, BRRTS No. 02-36-000268, AECOM Project No: 60135471 (82518), March 27, 2015

⁵ 2015 Fourth Quarterly Potable Well Monitoring Letter Report, Former Newton Gravel Pit, BRRTS No. 02-36-000268, AECOM Project No: 60135471 (82518), April 20, 2015

Following the 2015 Fourth Quarterly Potable Well Monitoring Letter Report, the last data gap well, 3911 Blackhawk Court, was sampled on July 08, 2015. The well came back with no VOCs detected. Therefore, this well has been designated a sentinel well. The latest results will be reported with the October 2015 results.

The extent of the COCs has been fully bound by either sentinel zone wells or bound by residents of the City of Manitowoc who are on city water.

Long term Potable Well Sampling Plan

Sampling Schedule

Three semi-annual potable well sampling events will occur over a period of one and a half years during the following months:

1. October 2015
2. March 2016
3. October 2016

Sampling Parameters

The water samples will be analyzed for the US EPA method 8260 list of VOCs consistent with previous sampling events.

Sampling Areas

Target Zone Wells (filled in blue circles on Figure 1):

- Wells will be sampled on a semi-annual basis for one and a half years in October 2015, March 2016, and October 2016.
- Includes wells with detections of cis-1,2-dichloroethene and/or vinyl chloride.
- Includes a total of 25 wells identified for semi-annual sampling.

Target Zone Wells	
3617(3621) Viebahn St	2916 CTH CR
3701 Viebahn St	3504 CTH CR
3815 Viebahn St	3618 CTH CR
3817 Viebahn St	4002 Thunder Ridge
3825 Viebahn St	4005 Thunder Ridge
4025 Viebahn St	4010 Thunder Ridge
4101 Viebahn St	4027 Thunder Ridge
4141 Viebahn St (2717 CTH CR)	4101 Thunder Ridge
3303 Hecker Rd.	4111 Thunder Ridge
3327 Hecker Rd.	3921 Black Hawk Ct.
3461(3417) Hecker Rd.	4159 Silver Creek Rd.
3702 Hecker Rd.	3027 Orchard Ln.
2734(2804) CTH CR	

The city is in the process of replacing the private well at 3504 CTH CR. Following the replacement of the well, it will be sampled three times to confirm the new well is not impacted by the COCs. After the three samples are collected, and confirmed clean, the address will be moved to the replacement well list for future sampling events.

Sentinel Zone Wells (full yellow circles or yellow circles with blue outline on Figure 1):

- Wells will be sampled on a three event rotating cycle where each of the wells will be sampled one time over the next one and half years. The first semi-annual sampling event will be in October 2015.
- Includes a total of 32 wells identified for semi-annual sampling over the course of a one and a half year period, 11 wells the first two semi-annual sampling events and 10 wells the last semi-annual sampling event as listed in Table 1. In each semi-annual sampling event wells from different areas of the project area will be sampled to allow monitoring across the site.
- If sampling results indicate that a Sentinel Zone well is impacted by cis-1,2-dichloroethene and/or vinyl chloride, the data may be used to redefine the Target Zone and Sentinel Zone. The sampling frequency of the newly impacted well will be adjusted to semi-annual beginning with the next scheduled semi-annual sampling event.

Sentinel Zone Wells	
4219 Viebahn St	3533 CTH CR
3121 Hecker Rd.	3611 CTH CR
3320 Hecker Rd.	3626(3626B) CTH CR
3625 Hecker Rd.	3627 CTH CR
3720 Hecker Rd.	4024 CTH CR
2706 CTH CR	4101 CTH CR
2716 CTH CR	4127 Thunder Ridge Rd.
2832 (2904) CTH CR	3911 Blackhawk Ct
2911 CTH CR	3128 Orchard Ln.
2917 CTH CR	3318 Orchard Ln.
3224 CTH CR	3420 Orchard Ln.
3312 CTH CR	3524 Orchard Ln.
3322 CTH CR	3812 Silver Creek
3412 CTH CR	3902 Silver Creek Rd.
3422 CTH CR	4004 Silver Creek Rd.
3523 CTH CR	4156 Silver Creek

Replacement Wells (green circles on Figure 1):

- Includes wells that have been replaced due to detections of VOCs above the enforcement standards. Since the wells have been replaced, they have come back with no detected VOCs.
- Includes a total of six wells identified for sampling in October 2016. An additional well, 3405 CTH CR, will be added to the list after the well is completed and confirmation sampling confirms the well is clean.

Replacement Wells	
3515 Hecker Rd.	3023 CTH CR
3518 Hecker Rd.	3120 CTH CR
3609 Hecker Rd.	3403 CTH CR

Historically Sampled Wells (green triangles on Figure 1):

- Potable wells that have been historically sampled but are not currently part of this work plan are noted on Figure 1 and Table 1 as being outside the Sentinel Zone. These wells will not be sampled during this planning period.

Sampling Methods

Potable well owners will be notified by the City that their well has been chosen to be sampled. The City will then work with AECOM and the owners to schedule an appointment for AECOM field technicians to sample the private wells.

Samples will be collected following purging from a cold water tap or spigot as near to the well as possible, preferably prior to any storage/pressure tanks or physical/chemical treatment system that might be present. The system will be purged for at least 10 minutes immediately prior to sampling. Samples for VOCs will be collected in 40-ml glass vials with Teflon septa. The vials will be filled to the top, leaving no headspace or bubbles, then quickly capped. While filling sample containers, water flow will be reduced to a low level to minimize sample disturbance. The samples will be placed on ice in a cooler and picked-up by the laboratory analyzing the vials. The samples will be accompanied with a chain of custody (COC) for each sample.

Potable well water samples for quality control will also be collected. The quality control samples will include field duplicate and matrix spike (MS)/matrix spike duplicate (MSD) samples. The quality control samples will be determined by AECOM field personnel. Laboratory provided trip blanks will accompany the sample containers to evaluate the potential for analytical artifacts associated with container handling in the field and laboratory.

Water samples will be submitted to a Wisconsin Administrative Code (WAC) Chapter NR 149 certified laboratory for analyses of VOCs (EPA Method SW 8260B). The groundwater analytical results will be compared to the WAC Ch. NR 140.10, Table 1, Public Health Groundwater Quality Standards.

Reporting

Reporting of laboratory analytical results will be made to the City, WDNR, and individual potable well owners.

A semi-annual potable well sampling letter report will be submitted to the WDNR. The letter report will include a written summary of the sampling event, summarized laboratory results in tabular form, a figure showing the results, and copies of laboratory reports.

Well owner reporting of analytical results will include a cover letter explaining the results with an attached copy of the laboratory report. The WDNR will be copied on the well owner reporting.

Ongoing Activities

Currently locations with potable wells that have VOC compounds above drinking water standards are receiving bottled water provided by the City.

The City is in the process of extending a water main from the intersection of S 35th Street and Viebahn Street to the west along Viebahn to the intersection of CTH CR. The water main will go north to complete a loop by connecting to the water main along CTH CR. The water line will also be extended south on CTH CR to the vicinity of 2916 CTH CR. After the water main is installed the houses that have enforcement standards will be connected to the City of Manitowoc water. Following the connection of city water, seven of the eight wells will be abandoned. The eighth well located at 4141 Viebahn St (2717 CTH CR) will stay in-service as a non-potable agricultural use well. Therefore, there are a total of eight wells that will be taken off the sampling list after the city water is connected, see Table 1.

Wells To Be Removed From The Sampling List After City Water Main Installation	
3617(3621) Viebahn St	4101 Viebahn St
3701 Viebahn St	4141 Viebahn St (2717 CTH CR)
3815 Viebahn St	2734(2804) CTH CR
4025 Viebahn St	2916 CTH CR

If you have any questions or require additional detail, please contact Kathleen M. McDaniel, City Attorney, at 920-686-6990, kmcdaniel@manitowoc.org or Dave Henderson at 414-944-6190, dave.henderson@aecom.com.

Respectfully Submitted,

AECOM



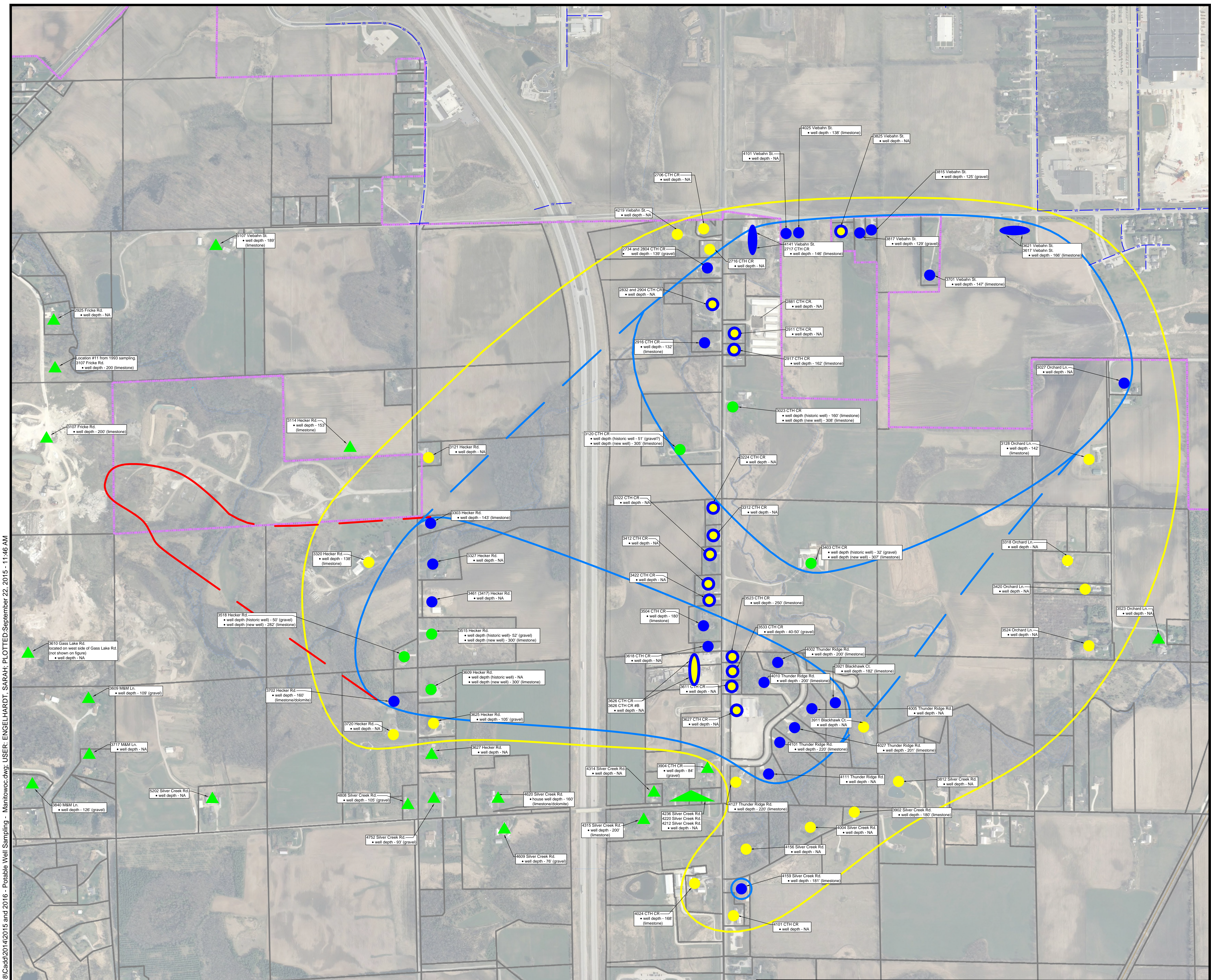
Jordan Junion
 Geologist



David Henderson, P.E.
 Senior Project Manager

c: Kathleen M. McDaniel, City Attorney, City of Manitowoc
 Dan Koski, Director of Public Infrastructure, City of Manitowoc

Attachments: Figure 1, 2015 and 2016 Potable Well Location
 Table 1, Summary of Quarterly Potable Well Sampling



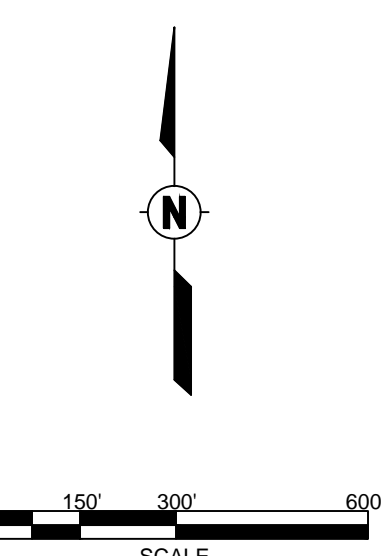
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LEGEND:

- | | | |
|---|--|--------------------------|
| PROPERTY BOUNDARY | -REPLACEMENT WELL WITHIN TARGET ZONE | DATA GAP SAMPLE LOCATION |
| PROPERTY BOUNDARY - CITY LIMITS | -UPGRADIENT AND HISTORICALLY SAMPLED WELLS | WELL OUT OF SERVICE |
| -POTABLE WATER SUPPLY (from City of Manitowoc) | TARGET ZONE | |
| POTABLE WELL SAMPLE LOCATIONS -WITHIN TARGET ZONE | SENTINEL ZONE | |
| -WITHIN TARGET ZONE WITH NO DETECTS | FORMER GRAVEL PIT ZONE | |
| -WITHIN SENTINEL ZONE | | |

NOTES:

- VOCs detected from likely laboratory or sampling cross-contamination not reported on figure.
- VOC values for Q3-2014 sampling event reported on figure.
 - VOCs = Volatile Organic Compounds
 - cis-DCE = cis-1,2-Dichloroethene
 - VC = Vinyl Chloride
 - bold** = PAL exceedance
 - bold and underlined** = ES exceedance
 - PAL** = Preventive Action Limit
 - ES** = Enforcement Standard
- Analytical data presented in µg/L.



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FORMER NEWTON GRAVEL PIT		
2015 AND 2016 POTABLE WELL SUMMARY		
Project Number: 60311767	Drawn By: SAE	Date: 9/22/2015
		Figure No. 1

**TABLE 1
POTABLE WELL MONITORING WORK PLAN
SUMMARY OF SEMI-ANNUAL POTABLE WELL SAMPLING, 2015 to 2016
FORMER TOWN OF NEWTON GRAVEL PIT
MANITOWOC, WISCONSIN**

Well Address	1st Event October 2015	2nd Event March 2016	3rd Event October 2016	Wells to be Abandoned After City Water Main Installation
Target Zone Wells				
3617(3621) Viebahn St	X	X	X	X
3701 Viebahn St	X	X	X	X
3815 Viebahn St	X	X	X	X
3817 Viebahn St	X	X	X	
3825 Viebahn St	X	X	X	
4025 Viebahn St	X	X	X	X
4101 Viebahn St	X	X	X	X
4141 Viebahn St	X	X	X	X - note, well to be left in- place for agricultural use
2717 CTH CR				
3303 Hecker Rd.	X	X	X	
3327 Hecker Rd.	X	X	X	
3461(3417) Hecker Rd.	X	X	X	
3702 Hecker Rd.	X	X	X	
2734(2804) CTH CR	X	X	X	X
2916 CTH CR	X	X	X	X
3504 CTH CR	X	X	X	
3618 CTH CR	X	X	X	
4002 Thunder Ridge	X	X	X	
4005 Thunder Ridge	X	X	X	
4010 Thunder Ridge	X	X	X	
4027 Thunder Ridge	X	X	X	
4101 Thunder Ridge	X	X	X	
4111 Thunder Ridge	X	X	X	
3921 Black Hawk Ct.	X	X	X	
4159 Silver Creek Rd.	X	X	X	
3027 Orchard Ln.	X	X	X	
Replacement Wells				
3515 Hecker Rd.	X		X	
3518 Hecker Rd.	X		X	
3609 Hecker Rd.	X		X	
3023 CTH CR	X		X	
3120 CTH CR	X		X	
3403 CTH CR	X		X	
Sentinel Zone Wells				
4219 Viebahn St	X			
3121 Hecker Rd.	X			
3320 Hecker Rd.		X		
3625 Hecker Rd.			X	
3720 Hecker Rd.		X		
2706 CTH CR			X	
2716 CTH CR	X			
2832 (2904) CTH CR		X		
2911 CTH CR			X	
2917 CTH CR	X			
3224 CTH CR		X		
3312 CTH CR			X	
3322 CTH CR	X			
3412 CTH CR		X		
3422 CTH CR			X	
3523 CTH CR	X			
3533 CTH CR		X		
3611 CTH CR			X	
3626(3626B) CTH CR	X			
3627 CTH CR		X		
4024 CTH CR			X	
4101 CTH CR	X			
4127 Thunder Ridge Rd.		X		
3911 Blackhawk Ct			X	
3128 Orchard Ln.	X			
3318 Orchard Ln.		X		
3420 Orchard Ln.			X	
3524 Orchard Ln.	X			
3812 Silver Creek		X		
3902 Silver Creek Rd.			X	
4004 Silver Creek Rd.	X			
4156 Silver Creek		X		
Historically Sampled Wells				
5107 Veibahn St.				
2925 Fricke Rd.				
3107 Fricke Rd.				
3610 Gass Lake Rd.				
3609 M&M Ln.				
3717 M&M Ln.				
3804 M&M Ln.				
3114 Hecker Rd.				
3627 Hecker Rd.				
2881 CTH CR				
3904 CTH CR				
4212 Silver Creek				
4220 Silver Creek				
4236 Silver Creek				
4314 Silver Creek Rd.				
4315 Silver Creek Rd.				
4609 Silver Creek Rd.				
4620 Silver Creek Rd. (two wells)				
4752 Silver Creek Rd.				
4808 Silver Creek Rd.				
5202 Silver Creek Rd.				
3523 Orchard Ln.				