

BURGESS & NIPLE

5085 Reed Road | Columbus, OH 43220 | 614.459.2050

Mr. Michael B. Nixon
Superintendent
City of Lancaster, Ohio
Water/Water Pollution Control
800 Lawrence Street
Lancaster, OH 43130-9401

Re: Groundwater Quality In the Vicinity of the City
of Lancaster Miller Park Potable Water Supply
Well Field

February 9, 2016

Dear Mr. Nixon:

Burgess & Niple, Inc. (B&N) has prepared this letter for the City of Lancaster, Ohio (City) to provide additional information regarding groundwater quality in the vicinity of the City's Miller Park potable water supply well field. In an email dated January 19, 2016 from Mr. Robert Hedges, Chairman of the City Water/Water Pollution Control Committee, to Mr. Brian Kuhn, Mayor of the City of Lancaster, Mr. Hedges proposed two possible scenarios that could be contributing to increasing specific conductance values in monitoring well MW-9D in the vicinity of Miller Park potable water supply well field. The first scenario concluded that the water quality has been affected by activities being conducted on the new County Jail site at 342 W. Wheeling Street in Lancaster, Ohio, which is located just to the south of the Miller Park well field. The second scenario concluded that the well integrity at MW-9D has been degraded such that the seal between the upper zone and lower zone of the aquifer has failed. The following information has been compiled to address the City's concerns.

Bennett & Williams Letter Dated January 29, 2016

Bennet & Williams (B&W) submitted a letter dated January 29, 2016 to Mr. Dennis Keller, Facilities Manager for the Fairfield County Board of Commissioners that provided their professional opinions regarding the changing groundwater quality observed in the vicinity of the Miller Park potable water supply well field and the new County Jail property, as referenced by Mr. Hedges. B&N had a phone conference with B&W on January 28, 2016 to further discuss possible well construction details that may be influencing water quality.

- B&W discussed the possibility of malfunctioning field meters. They concluded that the meters were calibrated and that the readings were not inconsistent at the other monitoring wells sampled. B&N concurs with this conclusion.
- B&W noted that Wright's Drilling Company completed the well installation of monitoring wells MW-9S and MW-9D. Based upon B&N's experience with Wright's Drilling, these individuals are some of the most competent and professional drillers in the industry. During installation of MW-9D, a considerable quantity of heaving sands was encountered. Field personnel placed a hydraulic head into the augers to attempt to maintain pressure to allow the well to be installed to the desired depth. The sand pack around the well screen was extended 5 feet above the top of the screened interval to provide additional separation distance from the bentonite slurry column. Remaining consistent with the procedures detailed in Section 3.2.4 of the City's *Ground Water Monitoring Plan for the City of Lancaster Miller Park Wellfield Wellhead Protection Program*, a highly viscous bentonite slurry mixture was prepared and placed in lieu of bentonite pellets due to

the volume of water within the boring. The drillers used a tremie pipe to place the slurry and a slow rate/low pressure was maintained so as to not wash out the sand pack surrounding the screened interval. The slurry was extended to the surface and consisted of bentonite rather than a cement/bentonite mixture, which is consistent with the current methodology detailed in Chapter 7 of the *Technical Guidance Manual for Groundwater Investigations* (Ohio EPA, February 2008). Assuming a thick slurry was placed at low pressures, based upon our discussions, monitoring well MW-9D was installed using an acceptable method and a common industrial practice.

- B&W discussed the presence, or lack thereof, of a separating unit between the shallow sand unit (“S” monitoring wells) and deep sand unit (“D” monitoring wells). In their January 29, 2016 letter, they note that the aquifer was originally modeled as a single unconfined aquifer. Based upon our review of the boring logs for MW-9S and MW-9D, there is no distinct low-permeability unit (i.e. clay) that could be classified as a separating aquitard in the area. Therefore, it appears that the shallow wells monitor the upper portion of the regional sand and gravel aquifer and the deep wells monitor the lower portion of the regional sand and gravel aquifer.
- B&W presented their theory of the varying specific conductance data reported for MW-9D. They completed parametric Analysis of Variance (ANOVA) tests on each of the available data sets that included detected concentrations within water supply wells PW-15 and PW-23. Based upon these statistical analyses, they concluded that there was statistical evidence that the water quality data at the two water supply well locations was statistically different for a number of constituents. Although the ANOVA test is intended to be completed on normally or log-normally distributed data sets (the Kruskal-Wallis test is used on non-normal data sets) and normality testing was not discussed, the overall evaluation, in general, provides statistical evidence of natural spatial variability in the vicinity of these two wells and is better than a simple “eyeball” test of percent difference calculation. This statistical difference is also carried over to the water quality within MW-9D. Several parameters exhibit higher concentrations in MW-9D when PW-23 was pumping at the time of sampling compared to when PW-15 was pumping. Based upon the B&W statistics, B&N agrees that there is another possible scientifically based reason for the variability of the analytical results observed in MW-9D other than the two scenarios presented by Mr. Hedges (either a breach of the confining layer or a release from the new County Jail property).

B&N Additional Evaluation of Groundwater Quality Data in the Vicinity of the Miller Park Well Field

B&N completed additional descriptive statistics to assess the overall groundwater quality observed across the shallow and deep portions of the aquifer. Analytical results reported for shallow monitoring wells MW-1, MW-2S, MW-3 MW-4S, MW-5S, MW-6S, MW-7 and MW-8 between October 1995 and January 2016 were pooled and simple statistics such as minimum, maximum, mean, median, and standard deviation were calculated from the data sets. A majority of these data sets have over 200 results collected from various locations over 20 years and provide an excellent representation of seasonal, spatial, and temporal variability. The same calculations were performed on the pooled data sets reported for MW-1D, MW-4D, MW-5D, and MW-6D within the deep zone. Note that the mean, median, and standard deviation calculations were completed on only the detected results to obtain an overall representation of the detected portion of the data sets. B&N then compared the limited data sets reported for MW-9S and MW-9D collected between April 2015 and January 2016 to the respective descriptive statistics calculated from the remaining monitoring network. Each of these data sets reported for MW-9S and MW-9D only includes eight results, seven of which were collected over roughly a 3-month period. Thus, representation of seasonal and temporal variability is limited and the data is biased towards the fall/winter season. Summary tables of the descriptive statistics are included in **Attachment 1**. Except for potassium, sodium, and specific conductance, each of the data sets reported for MW-9S was within the historical range of concentrations reported for the remaining shallow monitoring wells. Except for manganese, sodium, and specific conductance, each of the data sets reported for MW-9D was within the historical range of concentrations reported for the remaining deep monitoring wells. Note that there are no U.S.

Environmental Protection Agency (EPA) human-health-risk-based Primary Drinking Water Standards (DWS) for manganese, potassium, sodium, or specific conductance. As detailed below, the intent of a Wellhead Protection Program (WHPP) is to identify possible chemicals of concern in and around a public water supply that may pose a threat to the receiving population.

Intent of Wellhead Protection Program Monitoring Network

The City was one of the first municipalities in the State of Ohio to voluntarily initiate a Wellhead Protection Plan WHPP in 1995 to proactively assess groundwater quality. The purpose for sampling the monitoring wells within the WHPP monitoring network is to assess the potential for releases of chemicals of concern into groundwater from sources located within 1 mile of the City's potable water supply well field that may pose a threat to receptors of the City's treated potable water supply. Chemicals of concern include those that have a U.S. EPA human-health-risk-based Primary DWS or Action Level (AL), which include antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, lead, mercury, selenium, thallium, and various organic parameters. Note that, based upon the City's historical analytical results tables, the only volatile organic compounds (VOCs) detected to date have been acetone and carbon disulfide in the mid-1990s, recent low-level concentrations of methyl tertiary butyl ether (MTBE) in MW-9S, and one detection of chloroform in MW-9D in October 2015, none of which exceeded a U.S. EPA Primary DSW. Moreover, acetone is a common laboratory cross contaminant.

The City has sampled the monitoring network since October 1995. Upon receiving the analytical data, the City compares the results to the applicable Primary and Secondary DWSs and ALs. The sampling and analysis completed by the City to date is consistent with other communities implementing a WWHPP. However, the City may wish to consider additional measures that would allow the use of the monitoring network to its full potential, specifically as an early detection program for migrating contaminants. In addition, several of the parameters analyzed are naturally occurring (specifically metals) and detected chemical concentrations may not be associated with an environmental release. Currently, the City should consider implementation of a means to determine whether these concentrations are naturally occurring or exhibit an overall increasing trend, which is commonly indicative of a release. The City should implement some form of statistical analysis to obtain a more comprehensive understanding of groundwater quality being drawn into the Miller Park Well Field.

Proposed Enhancements to the Monitoring Program

B&N submitted a letter dated December 8, 2015 to the City that detailed observed elevated arsenic concentrations in the vicinity of the Miller Park Well Field and demonstrated that these results are likely naturally occurring. Although the City has continued to implement a WHPP that is more proactive and protective than most other municipalities across Ohio, based upon the increased media coverage of water supply entities (i.e., Flint, Michigan and Sebring, Ohio), the City may wish to implement additional measures to provide the community with further confidence that the water they receive is of high quality and does not pose a health threat. The following measures would provide the City with more of a predictive and proactive approach to their WHPP. These recommendations are should be flexible and adjustable based upon additional data and circumstances.

1. Complete semiannual Mann-Kendall trend analyses and/or other published statistical analyses on each of the detected constituents with a Primary DWS for each monitoring well. This would identify statistically increasing trends of naturally occurring constituents that may be indicative of a release and/or change in regional geochemistry that could affect the efficiency of the City's Water Treatment Facility (WTF).
2. Since the monitoring wells are located within the one year time-of-travel radius from the Miller Park Well Field, the City might consider collecting samples from each of the water supply wells on a monthly basis through 2016 and analyze for those parameters that exceed a Primary DWS/AL or are determined to have a statistically increasing trend during the most recent monitoring event. Based upon the latest analytical data,

the only parameter to have been reported at concentrations above a U.S. EPA Primary DWS is naturally occurring arsenic. This additional sampling would provide documentation as to whether elevated concentrations observed in a monitoring well are reaching any of the water supply well locations. It would also allow the City WTF personnel to more efficiently operate the Miller Park well field.

3. Due to the observed variability of arsenic concentrations in the area, it would be beneficial to add a combined raw water tap sample (pre-treatment) and post-treatment water tap sample into the monitoring program so that pre- and post-treatment concentrations can be assessed with respect to the monitoring well and water supply well concentrations. The samples would be collected concurrently with the monthly water supply well samples and would be analyzed for the same analytical parameter list (i.e. arsenic). This additional information would provide a better understanding of the overall efficiency and capabilities of the existing WTF.
4. The City may wish to conduct a study of the treatment capabilities of the existing WTF. The ion exchange portion of the City's water treatment system is primarily intended to remove dissolved iron concentrations and reduce water hardness. However, the process is also able to reduce dissolved arsenic concentrations associated with iron oxide. Implementation of Option 3 above will provide data to document the overall effectiveness of heavy metals removal by the existing WTF. As detailed in the B&N letter to the City dated December 8, 2015, there is no regulatory requirement to discontinue use of a potable water supply well due to an exceedance of a Primary DWS, as the intent of the WTF is to remove potential contaminants prior to distribution to the community. Historical data has demonstrated that arsenic concentrations observed to be as high as 57 micrograms per liter ($\mu\text{g/l}$) in the monitoring wells (MW-4S), 18 $\mu\text{g/l}$ in at least one of the potable water supply wells (PW-28), and localized average concentrations as high as 33.0 $\mu\text{g/l}$ (MW-5D) have been effectively removed by the WTF prior to distribution. We have included a copy of the arsenic summary statistics again in **Attachment 1** for reference. An evaluation of historical results reported for monitoring wells and water supply wells and the associated concentrations observed in the post-treatment water supply would allow the City to establish action levels for constituents based upon the capabilities of the City's WTF to date. This study would allow the City to plan for additional contingency measures based upon the actual capabilities of the WTF rather than force a reactive response to elevated concentrations of naturally occurring constituents in and around the well field.

Contingency Sampling of Wells in Vicinity of County Jail Site

Mr. Hedges has expressed concern regarding possible chemicals of concern migrating within groundwater from the new County Jail site towards the City's Miller Park Well Field. With regard to his concerns associated with the construction and current condition of MW-9D, it appears that the well was constructed using typical well installation methods as discussed above. Based upon available analytical data reported for the Miller Park WHPP monitoring network, the Miller Park Well Field, and specifically, monitoring wells MW-9S and MW-9D and water supply wells PW-15 and PW-23, concentrations of chemicals of concern that have a U.S. EPA Primary DWS or AL have been documented to be lower in MW-9S and MW-9D (located downgradient of the new County Jail site) than naturally occurring concentrations reported for other monitoring wells in the Miller Park WHPP monitoring network. Again, the City's WTF has continued to be effective in reducing background elevated concentrations of chemicals of concern to post-treatment water analytical results that are below respective U.S. EPA Primary DWSs. Mr. Hedges has suggested possibly discontinuing the use of PW-15 and/or PW-23 as part of the City's Miller Park combined raw water source in the event an arsenic concentration exceeds the Primary DWS in either production well. Keep in mind that the arsenic concentrations measured within MW-9S, MW-9D, PW-15 and PW-23 have been lower than in other locations across the area.

The analytical data sets for MW-9S and MW-9D are relatively small compared to the remaining monitoring wells used as part of the Miller Park Well Field WHPP, primarily due to the fact that the wells were only recently installed

in March 2015. The data sets are currently biased with regard to seasonal representation as a majority of the samples to date have been collected during the fall/winter of 2015/2016. B&N recommends that monitoring wells MW-9S and MW-9D and water supply wells PW-15 and PW-23 continue to be sampled on a monthly basis through 2016 to get a better understanding of seasonal and temporal variability. The City may wish to perform statistical analyses on the data (as detailed above) to identify possible trends in the analytical results. It may be beneficial to also sample monitoring wells MW-4S and MW-4D concurrently, as these wells are located to the south of the property, are hydraulically upgradient of the new County Jail site, and will provide an indication of the naturally occurring concentrations of chemicals of concern that have not been affected by operations on the new County Jail property.

If you have any questions or comments, please do not hesitate to call.

Sincerely,



Michael E. Leone, CPG
Project Director



Thomas J. Mignery, CPG, VAP CP
Principal in Charge

MEL/TJM:cmc
Attachments

ATTACHMENT 1
SUMMARY STATISTICS

City of Lancaster, Ohio
 Miller Park Wellfield Groundwater Monitoring Network
 Shallow Zone
 Summary Statistics
 October 1995 - January 2016

PARAMETERS	Units	MCL/SMCL/ ACTION LEVEL	Shallow Monitoring Wells											
			MW-1S,2,3,4S,5S,6S,7,8						MW-9S					
			Sample Size	Minimum	Maximum	Mean ¹	Median ¹	St.Dev. ¹	Sample Size	Minimum	Maximum	Mean ¹	Median ¹	St.Dev. ¹
INORGANICS														
ALUMINUM	mg/L	50 to 200 (S)	114	51.0	970	348	180	345	8	ND	ND	ND	ND	ND
ANTIMONY	ug/L	6	249	0.88	12.0	5.89	4.85	2.51	8	ND	ND	ND	ND	ND
ARSENIC	ug/L	10.0	249	1.10	57.0	14.8	14.7	8.67	8	5.00	11.0	7.00	6.50	2.07
BARIUM	ug/L	2,000	129	14.0	740	233	190	202	8	393	475	423	416	29.1
BERYLLIUM	ug/L	4.0	249	1.00	1.00	1.00	1.00	NA	8	ND	ND	ND	ND	ND
CADMIUM	ug/L	5.0	249	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
CALCIUM	mg/L	--	248	3.60	393	143	130	50.4	8	142	179	157	160	13.2
CHROMIUM	ug/L	100	249	17.0	17.0	17.0	17.0	NA	8	ND	ND	ND	ND	ND
COBALT	ug/L	--	249	10.0	10.0	10.0	10.0	NA	8	ND	ND	ND	ND	ND
COPPER	ug/L	1,000 (S) / 1,300 (A)	115	10.0	31.0	18.1	18.0	6.96	8	ND	ND	ND	ND	ND
CYANIDE	mg/L	0.2	225	0.00600	0.0100	0.00728	0.00655	0.00187	8	ND	ND	ND	ND	ND
IRON	ug/L	300 (S)	248	4.00	35,900	5,824	3,100	5,711	8	139	2,160	1,002	744	770
LEAD	ug/L	15 (A)	249	2.00	2.00	2.00	2.00	NA	8	ND	ND	ND	ND	ND
MAGNESIUM	mg/L	--	248	22.0	445	37.0	35.0	27.5	8	39.1	50.8	44.6	44.4	3.32
MANGANESE	ug/L	50 (S)	248	14.0	1,040	287	260	168	8	128	204	147	141	23.7
MERCURY	ug/L	2.0	249	0.20	0.90	0.47	0.30	0.38	8	ND	ND	ND	ND	ND
NICKEL	ug/L	--	249	10.0	45.0	27.5	27.5	24.7	8	ND	ND	ND	ND	ND
POTASSIUM	mg/L	--	71	0.93	14.2	5.16	4.15	2.94	8	16.8	30.1	19.2	17.7	4.48
SELENIUM	ug/L	50	249	5.00	134	14.0	10.0	22.1	8	ND	ND	ND	ND	ND
SILVER	ug/L	100 (S)	249	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
SODIUM	mg/L	--	47	8.30	132	46.7	45.5	26.7	8	166	302	218	200	49.5
SULFIDE	mg/L	--	156	1.00	20.0	2.96	2.00	4.07	8	ND	ND	ND	ND	ND
THALLIUM	ug/L	2.0	249	0.50	0.53	0.52	0.52	0.02	8	ND	ND	ND	ND	ND
TIN	ug/L	--	157	60.0	60.0	60.0	60.0	NA	8	ND	ND	ND	ND	ND
VANADIUM	mg/L	--	249	0.010	0.010	0.010	0.010	NA	8	ND	ND	ND	ND	ND
ZINC	ug/L	5000 (S)	249	10.0	100	25.0	20.0	21.0	8	ND	ND	ND	ND	ND
VOLATILE ORGANICS VOC'S														
Method 8260	Varies	Varies	249	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
FIELD PARAMETERS														
STATIC WATER LEVEL	* from reference point		8	5.25	33.6	16.7	12.5	10.3	8	18.9	22.4	20.8	20.8	1.14
TEMPERATURE	°C	--	241	8.9	20.6	15.0	15.0	1.6	8	16.9	18.1	17.4	17.4	0.43
pH	S.U.	6.5-8.5 (S)	249	6.42	8.20	7.19	7.14	0.29	8	6.85	7.00	6.93	6.96	0.053
CONDUCTIVITY	umhos/cm	--	249	181	1,500	920	930	241	8	1,870	2,340	2,066	1,990	174

Shaded/bold constituents have either a human-health-risk-based Primary Drinking Water Standard or a Water Treatment Facility Action Level.
 Shaded/bold results are concentrations reported for MW-9S that are outside the range of historical data reported to date for the remaining shallow wells.
 ND = All results historically nondetect.
 NA = All detected concentrations were the same.
¹ = Statistics were calculated using only the results reported above the laboratory detection limit.

City of Lancaster, Ohio
 Miller Park Wellfield Groundwater Monitoring Network
 Deep Zone
 Summary Statistics
 October 1995 - January 2016

PARAMETERS	Units	MCL/SMCL/ ACTION LEVEL	Deep Monitoring Wells											
			MW-1D,4D,5D,6D						MW-9D					
			Sample Size	Minimum	Maximum	Mean ¹	Median ¹	St.Dev. ¹	Sample Size	Minimum	Maximum	Mean ¹	Median ¹	St.Dev. ¹
INORGANICS														
ALUMINUM	mg/L	50 to 200 (S)	117	90.0	240	175	185	68.6	8	ND	ND	ND	ND	ND
ANTIMONY	ug/L	6	117	4.20	7.50	5.78	5.90	1.11	8	ND	ND	ND	ND	ND
ARSENIC	ug/L	10.0	117	1.00	53.0	15.3	11.0	11.6	8	6.00	13.0	8.25	8.00	2.25
BARIUM	ug/L	2,000	117	40.0	440	258	251	79.8	8	68.0	135	91.6	76.0	26.3
BERYLLIUM	ug/L	4.0	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
CADMIUM	ug/L	5.0	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
CALCIUM	mg/L	--	117	62.0	310	105	105	27.7	8	108	149	126	125	15.2
CHROMIUM	ug/L	100	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
COBALT	ug/L	--	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
COPPER	ug/L	1,000 (S) / 1,300 (A)	117	11.0	20.0	15.5	15.5	6.36	8	ND	ND	ND	ND	ND
CYANIDE	mg/L	0.2	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
IRON	ug/L	300 (S)	117	80.0	13,800	4,141	3,570	2,210	8	298	1,830	932	934	629
LEAD	ug/L	15 (A)	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
MAGNESIUM	mg/L	--	117	19.0	42.0	31.0	30.0	4.24	8	29.8	39.4	34.2	33.9	3.07
MANGANESE	ug/L	50 (S)	117	44.0	351	145	75.0	100	8	241	392	313	313	52.7
MERCURY	ug/L	2.0	117	0.25	4.00	1.54	0.36	2.13	8	ND	ND	ND	ND	ND
NICKEL	ug/L	--	117	30.0	30.0	30.0	30.0	NA	8	ND	ND	ND	ND	ND
POTASSIUM	mg/L	--	117	0.91	15.0	2.49	1.60	2.84	8	3.00	7.70	5.10	4.85	1.94
SELENIUM	ug/L	50	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
SILVER	ug/L	100 (S)	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
SODIUM	mg/L	--	117	4.90	76.0	22.7	20.0	18.3	8	20.0	100	55.0	59.6	30.9
SULFIDE	mg/L	--	117	1.20	2.00	1.73	2.00	0.46	8	ND	ND	ND	ND	ND
THALLIUM	ug/L	2.0	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
TIN	ug/L	--	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
VANADIUM	mg/L	--	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
ZINC	ug/L	5000 (S)	117	10.0	60.0	29.6	28.0	12.9	8	ND	ND	ND	ND	ND
VOLATILE ORGANICS VOC'S														
Method 8260	Varies	Varies	117	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	ND
FIELD PARAMETERS														
STATIC WATER LEVEL	* from reference point		4	3.97	23.5	13.3	13.0	8.0	8	19.5	23.2	21.7	21.7	1.39
TEMPERATURE	°C	--	117	8.9	20.6	14.2	13.9	2.0	8	15.2	16.7	16.1	16.1	0.5
pH	S.U.	6.5-8.5 (S)	117	6.60	7.80	7.33	7.34	0.24	8	6.94	7.21	7.10	7.09	0.096
CONDUCTIVITY	umhos/cm	--	117	367	1,007	682	680	120	8	810	1,415	1,084	1,112	250

Shaded/bold constituents have either a human-health-risk-based Primary Drinking Water Standard or a Water Treatment Facility Action Level.
 Shaded/bold results are concentrations reported for MW-9S that are outside the range of historical data reported to date for the remaining shallow wells.
 ND = All results historically nondetect.
 NA = All detected concentrations were the same.
¹ = Statistics were calculated using only the results reported above the laboratory detection limit.

City of Lancaster, Ohio
Miller Park Potable Water Supply Well Field
Arsenic Concentrations in the WHPP Monitoring Network

Well No.	Sample Size	Percent ND	Minimum (µg/l)	Maximum (µg/l)	Mean ¹ (µg/l)	No. Values >10 µg/l	Percent >10 µg/l
Shallow Monitoring Wells							
MW-1S	31	22.6%	ND	12.0	7.2	2	6.5%
MW-2	31	41.9%	ND	18.0	8.6	2	6.5%
MW-3	31	6.5%	ND	28.0	18.7	27	87.1%
MW-4S	31	0.0%	1.7	57.0	18.5	23	74.2%
MW-5S	31	90.3%	ND	13.0	8.5	1	3.2%
MW-6S	25	100.0%	ND	ND	ND	0	0.0%
MW-7	31	3.2%	ND	30.0	17.7	28	90.3%
MW-8	31	100.0%	ND	ND	ND	0	0.0%
MW-9S	8	0.0%	5.0	11.0	7.0	0	0.0%
Unit Characteristics	250	42.8%	ND	57.0	15.0	83	33.2%
Deep Monitoring Wells							
MW-1D	31	6.5%	ND	16.0	11.3	19	61.3%
MW-4D	31	12.9%	ND	13.0	7.6	4	12.9%
MW-5D	24	0.0%	7.0	53.0	33.0	23	95.8%
MW-6D	31	6.5%	ND	20.0	11.8	20	64.5%
MW-9D	8	0.0%	6.0	13.0	8.3	0	0.0%
Unit Characteristics	125	6.4%	ND	53.0	14.8	66	52.8%
Water Supply Wells							
PW-15	5	20.0%	ND	8.0	5.3	0	0.0%
PW-23	5	0.0%	7	9.0	8.0	0	0.0%
PW-28 ²	22	4.5%	ND	18	12	NA	NA

All concentrations are reported as dissolved arsenic.
µg/l = micrograms per liter or parts per billion.

¹ = Average concentrations were calculated using only the results reported above the laboratory detection limit.

² = Analytical results obtained from Ohio EPA Ambient Groundwater Quality Monitoring Program, Lancaster Wellfield PW-28 (3/5/92-9/23/14).