



State of Ohio Environmental Protection Agency

Northwest District Office

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Ted Strickland, Governor
Lee Fisher, Lieutenant Governor
Chris Korleski, Director

Re: Statistical Report of Groundwater Quality
St. Marys Landfill, Auglaize County
Notice of Violation

July 20, 2009

Auglaize County Commissioners
209 South Blackhoof Street
Wapakoneta, Ohio 45895

And

Mr. Thomas Hitchcock
Director of Public Service and Safety
City of St. Marys
101 East Spring Street
St. Marys, Ohio 45885

Dear Commissioners and Mr. Hitchcock:

The City of St. Marys Landfill is no longer an operating facility. The Ohio Environmental Protection Agency (Ohio EPA) has reviewed, "Statistical Report of Groundwater Quality for the Detection Monitoring Program; Notification of Statistical Significance, Notification of Constituents Detected in Assessment Monitoring Wells at the St. Marys Landfill, and Results for Third and Fourth Groundwater Monitoring Events Completed for Investigative Wells MW-7, MW-8, and MW-9; AUG005.100.0005.DOC"; dated April 24, 2009, and received by Ohio EPA on April 27, 2009.

The facility is currently operating under the detection monitoring plan as required by OAC Rule 3745-27-10 (D) for the uppermost aquifer system, and under the assessment monitoring plan as required by OAC Rule 3745-27-10 (E) for the stated significant zone of saturation. A revised corrective measures plan has been submitted to Ohio EPA for the stated significant zone of saturation, but has been found to be inadequate. Based upon Ohio EPA's evaluation, the well systems are not adequate for the significant zones of saturation. The owner or operator should move toward implementation of an effective corrective measure. The following are Ohio EPA comments relating to the current submittal.

X

COMMENTS

VIOLATIONS

1. **The owner/operator continues to be in violation of OAC Rule 3745-27-10 (C)(1) and (C)(1)(a) which require that the ground water monitoring program include consistent sampling and analysis procedures and statistical methods that are protective of human health and the environment and that are designed to ensure monitoring results that provide an accurate representation of ground water quality at the background and downgradient wells; and that the owner or operator use the procedures documented within the sampling and analysis plan. The owner/operator needs to sample wells that purge dry as soon as enough water is available. Other wells should be sampled immediately after purging to ensure that representative samples are collected.**

The sampling and analysis plan, revised April 2009, states on page 22, "If a sample cannot be obtained after the initial purging, multiple trips to the well with less than 24 hours between trips will be made in accordance with the Ohio EPA Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring (February 1995)." This manual indicates that for wells that purge dry the samples should be collected as soon as sufficient water is available. This is because extended recovery times after purging allow the ground water to equilibrate with atmospheric conditions thereby changing ground water chemistry.

A review of the field data sheets in the submittal indicates that wells: MW-1 (not dry) MW-2 (not dry), MW-3 (dry), MW-4 (not dry), MW-5 (not dry), MW-6 (dry), MW-7 (not dry), MW-8 (dry), MW-9 (not dry), AW-1 (not dry), AW-2 (not dry), AW-3 (dry), AW-4 (dry), BW-1 (not dry), BW-2 (not dry), BW-3 (not dry), BW-4 (not dry), BW-5 (dry), and BW-6 (not dry), whether purged dry or not, were purged on February 10, 2009, but not sampled until February 11, 2009. Some of these wells recharge quickly enough to collect samples immediately after purging. Other wells recharge quickly enough to collect samples in much less than 24 hours. Only 6 of these 19 wells (MW-3, MW-6, MW-8, AW-3, AW-4, and BW-5) were purged dry. (MW-8, which purged dry this event, was not purged dry in the previous event.) The ability for some of the wells to be sampled on the same day has been established during previous sampling events. During the April 1, 2009 sampling event for MW-7, MW-8, and MW-9 and resampling event for MW-6, all four wells were purged and sampled on the same day with purging and sampling separated by only about five (5) hours).

During the September 2005, resampling event, three wells were purged on September 21, 2005, and then sampled on the same day. BW-2 was sampled at 13:35; BW-3 was sampled at 13:17; and BW-5 was sampled at 13:55. During the September 2006, resampling event, seven wells were purged on September 19, 2006, and sampled the same day. Some of these wells (MW-3, AW-3, and AW-4) were originally bailed dry, but were sampled within about three hours of purging. During the September 24, 2007, resampling event five wells were purged and sampled on the same day with MW-3, which was bailed dry, being sampled within three hours and eleven minutes of the time of purging. (It is not clear if the time of purging was at the beginning or the end of purging.) The wells, sampled on July 8, 2008, could have been sampled on July 7, 2008, within a reasonably short time span after the end of purging. Also, during the March 13, 2008, resampling event, well MW-6 was bailed dry at 13:15 and sampled at 14:30, which is only one (1) hour and 15 minutes after purging the well dry. Clearly this well can be purged and sampled on the same day and sampling can occur within a few hours of purging.

In addition, some of the wells which should have been sampled shortly after purging display changes in field parameters between the end of purging on February 10, 2009, and sampling on February 11, 2009. Following is a table indicating the change in field parameter values from purging on February 10, 2009, to sampling on February 11, 2009, for wells which were not bailed dry and displayed a significant change in ground water chemistry between purging and sampling. (It should be noted that the typical wait time between purging and sampling is about 22 to 23 hours.) This change may be due to stagnation of the water in the well between purging and sampling. The values which appear to show a significant change are in **bold**. These differences in values exceed the 10% value specified by the City in SOP No. F3007 included in their sampling and analysis plan. The values marked with an asterisk are those which exceed the current Ohio EPA standards (pH ± 0.2 S.U., conductance $\pm 3\%$, temperature $\pm 0.5^\circ\text{C}$).

WELL	02/10/09 pH	02/10/09 pH	02/10/09 Temp.	02/11/09 Temp.	02/11/09 Cond.	02/11/09 Cond.
MW-1	6.93	7.00	12.7	12.8	2030*	2380*
MW-2	6.92	7.20	11.6*	10.1*	1810*	1880*
MW-4	6.55*	6.89*	11.3	11.0	2190	2200

WELL	02/10/09 pH	02/10/09 pH	02/10/09 Temp.	02/11/09 Temp.	02/11/09 Cond.	02/11/09 Cond.
MW-5	6.82	7.00	12.5*	11.8*	1400*	1322*
MW-7	7.13	7.21	12.1	11.8	1660*	1720*
MW-9	7.06	7.16	12*	9.8*	932	935
AW-1	7.02	7.21	10.38*	10.0*	1283*	1420*
AW-2	7.87*	7.19*	10.8*	10.1*	1321*	1364*
BW-1	6.82	6.97	12.5	12.6	1450*	1580*
BW-2	7.08	7.29	11.8*	10.1*	1052	1039
BW-3	7.16	7.25	12.2*	10.1*	1280*	1180*
BW-4	7.06	7.21	12.5*	11.2*	1700	1740
BW-6	6.86	7.05	11.8*	11.0*	1940*	1810*

Also, it is recommended that recharge rates of wells that bail dry should be recorded and monitored in order for the field personnel to know when sufficient water is available and when it is appropriate to sample the well. It had been previously observed that enough water is available for sampling, in wells which bailed dry, within about three hours of purging.

2. **The City of St. Marys continues to be in violation of OAC Rule 3745-27-10 (C)(3)(b) which requires that the ground water flow direction be determined for all significant zones of saturation monitored. Maps for all significant zones of saturation need to be provided.**

Based on cross sections provided by the owner/operator in April 2009, there are two, and perhaps three separate significant zones of saturation. (AW-3 and AW-4 are screened in a separate zone from the other SZS wells based on the most recent cross sections.) The owner/operator submitted one map for the "Significant Saturated Units", indicating flow direction; however, since there are two (2) or three (3) significant zones of saturation, there should be a map for each of these zones.

3. **The City of St. Marys continues to be in violation of OAC Rule 3745-27-10 (B)(1)(b) which requires that the ground water monitoring system consist of a sufficient number of wells in significant zones of saturation that represent the quality of the ground water downgradient of the limits of solid waste placement. Additional wells need to be added to the monitoring system for each of the significant zones of saturation.**

OAC Rule 3745-27-10 (B)(1)(b) requires that the monitoring system have sufficient number of downgradient wells in the significant zones of saturation. Based on cross sections provided by the owner/operator in April 2009, there are two (or three) separate significant zones of saturation. As yet, and based on the cross sections, the two thicker zones (typically occurring at about 825' and 835') are not properly monitored and additional wells are needed in each of these zones as documented by Ohio EPA in a letter to the owner/operator dated September 27, 2004. In addition, the need for additional wells and the potential locations of these wells was discussed with the owner/operator in a meeting held in the City of St. Marys on September 16, 2004. Based on the recent cross sections and maps there are at least six (6) more monitoring wells that are needed at the site in the two thicker zones.

MORE INFORMATION NEEDED TO DETERMINE COMPLIANCE

4. **Compliance with OAC Rule 3745-27-10(C)(1), which requires the plan to contain procedures which produce results which are representative of the ground water of the site, cannot be determined at this time. The City of Saint Marys needs to indicate how the collection of excessively turbid samples provides results which are representative of the ground water of the site and ensure that low turbidity samples are collected from the site's wells. They should also document why the field and laboratory turbidities significantly differ for some of the wells listed in the table. Results from samples collected with excessive turbidities should not be used in background.**

A review of the laboratory turbidity, field turbidity, and total suspended solids (TSS) data for the well samples included in the submittal indicates that several wells continue to demonstrate excessive turbidity/TSS values. Following is a list of the wells which display significantly excessive values (bold) as observed from the results for the February 2009 sampling event and subsequent resampling event. Compared to previous sampling events, the number of wells displaying high turbidity readings appears to have decreased.

WELL	FIELD TURBIDITY (NTU)	LAB TURBIDITY (NTU)	LOWEST HISTORICAL REPORTED TURBIDITY (NTU)	SAMPLE DATE	TSS (MG/L)
MW-4	164	194	95	2/11/09	176
AW-4	214	15.6	13.4	2/11/09	16.5
MW-7	177	NA	19.8	4/01/09	39/25

5. **Compliance with OAC Rule 3745-27-10(B)(3)(e), which requires that monitoring wells be operated and maintained to perform to design specifications, and OAC Rule 3745-27-10 (C)(1), which requires that representative samples be collected, cannot be determined at this time. The City of St. Marys needs to describe any changes in well conditions which occurred at the site and if any of the wells were damaged. In addition, the owner/operator needs to describe any changes in purging, sampling or analytical procedures which might affect the turbidity of these samples.**

During the February 2009, sampling event, well MW-4 displayed excessive turbidity values. OAC Rule 3745-27-10 (B)(3)(e) requires that the wells be maintained to perform to design specifications and OAC Rule 3745-27-10 (C)(1) requires that procedures be used which will result in data which is representative of the ground water of the site. This excessive turbidity may be the result of sampling procedures or may be due to damage to the wells. Since the site's wells have been installed and sampled for some time and the conditions in most of the wells have stabilized at lower turbidity values, it would not be expected that turbidity values would rise due to natural conditions. Ground water velocities would typically not be sufficient to mobilize additional fine material to cause increased turbidity unless some outside stress was applied. Well MW-4 was purged and sampled with a bailer. Care must be taken to purge and sample with a bailer in order to not produce increased turbidity. It might be helpful to use a constant flow pump at a very slow rate to obtain low turbidity samples. The use of slow rate constant flow pumps has been successful in reducing turbidity at other sites.

6. **Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment number 1 above. The City needs to clarify when the field parameter results were determined both in the field and in the laboratory.**

A review of the field data sheets indicates that the field parameters were determined in the field on February 11, 2009, subsequent to purging on February 10, 2009. The laboratory report indicates, for example, that "Turbidity – Client Supplied" was analyzed on February 23, 2009. The laboratory report also indicates that specific conductance, pH, and temperature were also analyzed on February 23, 2009.

- 7. Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment number 1 above. The City needs to explain the significant difference between turbidity analyzed in the field and that analyzed in the laboratory.**

In the laboratory report for well AW-4, "Turbidity – Client Supplied" is said to be 214 NTU, while the turbidity analyzed by the laboratory is said to be 15.6 NTU. If sampling and analyses procedures are consistent, the results should be very similar.

- 8. Compliance with OAC Rule 3745-27-10 (C)(7)(g), which requires that background can only be added in groups of four after the latest data set has been analyzed and there are no statistical differences, cannot be determined at this time. The City needs to explain why sodium was updated for well MW-1 even though the Mann-Kendall test showed an increasing trend. The background data should not be updated until the new background is justified.**

In Appendix C the City provides statistical analyses of the data for well MW-1 and others. The analyses include the Mann-Kendall Trend Analysis. The test results state, " $|2.69182| > 1.64485$ indicating a trend". If there is a statistical difference (a trend) updating must be justified. A demonstration is usually necessary in accordance with OAC Rule 3745-27-10 (C)(7)(g).

- 9. Compliance with OAC Rule 3745-27-10 (C)(8), which requires the determination of a statistically significant increase over background; OAC Rule 3745-27-10(C)(4), which requires the establishment of background ground water quality; and OAC Rule 3745-27-10 (C)(10)(d), which requires the submittal of data summary tables, cannot be determined at this time. The City needs to clearly indicate what data are being used as background for each statistical procedure.**

The Shewhart-CUSUM control Chart for chloride at well MW-6 indicates that background consists of 16 samples. It is presumed that the first 16 samples are utilized, but this is not certain. If the first 16 samples are counted on the control chart the background data will include the data from June 20, 2001. If the first 16 data points are counted on the historical data chart (there are no duplicates) the background includes the data from December 8, 2000, and does not include the June 20, 2001, data. It is, therefore, not clear what data are being used in the background.

STATEMENTS

10. **Wells BW-5 and BW-6 were in the assessment program, but an OAC Rule 3745-27-10 (E)(9)(b) demonstration was approved and they were returned to the detection monitoring program. In the current submittal the owner/operator notes that they once again have exceeded the statistical limits for chloride.**
11. **Several parameters display exceedances in MW-2, MW-3, and MW-4. On page 5 of the submittal the owner/operator notes that, "For assessment monitoring wells, statistical significances were calculated for ammonia-nitrogen, chloride, potassium and sodium in monitoring well MW-2; chloride and sodium in monitoring well MW-3; chloride and sodium in monitoring well MW-4 and chloride in monitoring well MW-5." The owner/operator also notes that volatile organic compounds (VOCs) were observed above their respective practical quantitation limits in MW-2 and MW-4.**

A review of the data also indicates that arsenic concentrations were significantly above values recorded at upgradient well MW-1. Well MW-1 reported a concentration of <5.0 µg/L while MW-2 reported a concentration of 5.66 µg/L, MW-3 reported a concentration of 20.7 µg/L, and MW-4 reported a concentration of 41.5 µg/L. Although statistical analyses were not performed for metals on these wells, other metals appear to display significant increases above background.

12. **A letter dated June 13, 2008, (5-7702) sent by Ohio EPA to the City of Saint Marys provided thirty one comments related to violations, requests for more information and statements. No response has yet been received by Ohio EPA relative to these requests. More recently, a letter dated December 1, 2008, (5-8055) provided 11 comments.**

No response has been received from the City. It is important that the owner/operator respond to the agency requests.

13. In previous Ohio EPA reviews of owner/operator reports of ground water quality the agency indicated that the City of Saint Marys continued to be in violation relative to several rules and information requested by Ohio EPA of the owner/operator had not yet been received. This information is again requested. These comments include, but are not limited to:

- A violation of OAC Rule 3745-27-10 (B)(3)(d) relative to the documentation of redevelopment activities conducted in the summer of 2005,
- A violation of OAC Rule 3745-27-10 (C)(1)(a) relative to providing field data sheets for the March 29, 2007, re-sampling event,
- A violation of OAC Rule 3745-27-10(C)(7)(e) relative to the inclusion of metals values associated with excessive TSS values and reanalysis for statistically significant increases above background for the February and March 2007, sampling events, and
- A violation of OAC Rule 3745-27-10 (C)(1) relative to errors in the potentiometric surface map for the significant zones of saturation produced for the February and March 2007, sampling events.

14. Wells MW-2, MW-3, MW-4, and MW-5 are affected and in the assessment program. On the top of page 2 of the submittal the City states, "Note that significant saturated unit monitoring wells MW-1 through MW-5 are included in both the detection and assessment monitoring programs at the facility." While well MW-1 is used as a background well and is considered a detection well, wells MW-2 through MW-5 are affected based on OAC Rule 3745-27-10 (D) and are in the assessment program based on OAC Rule 3745-27-10 (E). If these wells are returned to the detection monitoring program by OAC Rule 3745-27-10 (E)(9), they will then be considered to be in the detection program.

15. **It is important that apparently non-representative data not be removed from the data set, but it should not be used in background.** At the base of page 2 and continuing to the top of page 3 the owner/operator states, "In a letter dated March 18, 2004, from Ben Smith of Ohio EPA to Mike Mackenzie of the City, Ohio EPA states that the low flow data does not appear to be an accurate representation of groundwater quality and requested it be removed from the dataset. Note that this data was not used in the evaluation and has been excluded from the facility's dataset."

Ohio EPA did not say to exclude the data from the dataset, but indicated that it not be used in background. In the March 2004 letter, Ohio EPA stated, "The analytical results determined from low flow samples should not be utilized in the background data set until they can be shown to be representative of the ground water of the site." It is important to retain the data, but not use it in background for several reasons including the situation where, in the future, it can be shown to be representative of the ground water of the site.

16. **In the second paragraph on page 4 the City indicates that chloride displays a statistically significant increase in bedrock wells BW-5 and BW-6.** Statistical significance has been observed for chloride at these wells in the past.
17. A review of the historical data for the wells at the site indicates that some of the wells display an apparent increasing trend for non-statistical parameters and perhaps a few statistical parameters. This information is shown on the following table. Investigation of these potential trends would be appropriate.

WELL	PARAMETERS	APPARENT INCREASING TREND?
MW-6	nitrate/nitrite conductance	yes
MW-1	conductance	yes
AW-1	conductance	yes
AW-3	nitrate/nitrite conductance chloride sodium	yes
AW-4	conductance	yes
BW-1	conductance	yes
BW-2	nitrate/nitrite	yes
BW-3	nitrate/nitrite conductance	yes

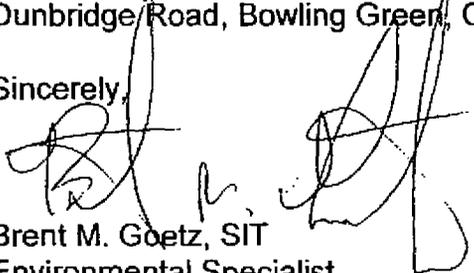
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WELL	PARAMETERS	APPARENT INCREASING TREND?
BW-4	nitrate/nitrite conductance	yes
BW-6	nitrate/nitrite conductance	yes

18. A review of the ground water surface data and constructed map on Figure 1 "Potentiometric Surface Map for the Significant Saturated Units" indicates a noticeable difference between wells MW-7 (ground water elevation at 836.50') and adjacent well AW-4 (ground water elevation at 837.36'). This information suggests that the two wells are completed in separate zones. It appears from the ground water data and the boring log/cross section data, that AW-4 is completed in a different zone than either MW-7 (deeper zone typically observed at about 825') or MW-4 (shallower zone typically observed at about 835').

If you have any questions regarding the details of this letter please feel free to contact Randy Skrzyniecki at the Ohio EPA Northwest District Office (419-373-3149). Any written correspondence should be sent to the attention of Brent Goetz, S.I.T Division of Solid and Infectious Waste Management, Ohio EPA Northwest District Office, 347 Dunbridge Road, Bowling Green, Ohio 43402.

Sincerely,



Brent M. Goetz, SIT
Environmental Specialist
Division of Solid and Infectious Waste Management

//lr

pc: Bill Petruzzi, Hull & Associates, Inc.

~~DSIWM-NWDO File: Auglaize County, City of St. Marys Landfill, Groundwater~~

ec: Mike Reiser, DSIWM, NWDO
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i.d.: 5-8504