



John R. Kasich, Governor  
Mary Taylor, Lt. Governor  
Scott J. Nally, Director

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

February 13, 2013

Mr. Eric Ostling, P.E.  
Director of Public Service and Safety  
City of St. Marys  
101 East Spring Street  
St. Marys, Ohio 45885

Dear Mr. Ostling:

The Ohio Environmental Protection Agency (Ohio EPA) has reviewed the report titled, "Statistical Report of Groundwater Quality and Notification of Constituents Detected during Assessment Activities, City of St. Marys, St. Marys Landfill, AUG008.100.0007"; Dated November 30, 2012. The report was submitted by hull & Associates on behalf of the owner/operator of the closed St. Marys Landfill (facility).

The facility is currently operating under the detection monitoring plan as required by Ohio Administrative Code (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 significant zones of saturation. A revised corrective measures plan had been submitted to Ohio EPA for the stated significant zones of saturation, but was 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. Following are Ohio EPA comments relating to the current submittal of the semiannual ground water report.

#### COMMENTS

#### VIOLATIONS

1. **The City of St. Marys continues to be in violation of: OAC Rule 3745-27-10(E)(1) which requires the owner/operator, who has not obtained approval to remain in detection monitoring under OAC Rule 3745-27-10(D)(7)(c)(ii) within two hundred and ten days from initial sampling, to implement a ground water quality assessment plan capable of determining the concentration, rate and extend of migration of waste-derived constituents; and OAC Rule 3745-27-10(E)(3) which requires the owner/operator, who has not obtained approval to remain in detection monitoring under OAC Rule 3745-27-10(D)(7)(c)(ii), to submit to Ohio EPA a ground water quality assessment plan within one hundred and thirty-five days of notifying the agency of a statistically significant increase over background. The owner/operator needs to comply with the requirements of these rules and provide and implement a ground water quality assessment plan.**

On January 19, 2012, Ohio EPA received the statistical report of ground water quality for the November 2, 2011, sampling event. On page 4 of this report in the section titled Notification of Statistical Significance the owner/operator indicates, "This report serves as formal notification to Ohio EPA that statistical significance were (sic) calculated for copper in uppermost aquifer monitoring wells BW-2, BW-3, BW-4 and BW-6, potassium, zinc, and 4-methyl-2-pentanone in uppermost aquifer monitoring well BW-3. The City is planning to complete confirmation resampling activities for these monitoring well/parameter combinations in the near future and will submit to Ohio EPA the results of these activities." No report of this resampling has been received by Ohio EPA. In addition no demonstrations in accordance with OAC Rule 3745-27-10 (D)(7)(c) or OAC Rule 3745-27-10 (E)(9) for these parameters at these wells have been provided to Ohio EPA and no approval to remain in or return to the detection monitoring program has been granted.

The two hundred and ten day period from initial sampling ended May 30, 2012. The owner/operator is not complying with OAC Rule 3745-27-10 (E). The one hundred thirty five day period from notification ended June 4, 2012. No assessment plan for these wells has been received by Ohio EPA. These wells have, by rule, been in the assessment program since the end of May 2012. The owner/operator must comply with the above-stated rules.

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 and, most recently, in March 2012, there are three separate significant zones of saturation. The owner/operator submitted one map for the "Significant Saturated Units", indicating flow direction; however, since there are 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.**

Based on cross sections provided by the owner/operator in April 2009 and, most recently, in March 2012, there are three (3) separate significant zones of saturation. As of 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 five (5) more monitoring wells that are needed at the site in the two thicker zones in addition to the investigative wells MW-7, MW-8, and MW-9.

**MORE INFORMATION NEEDED TO DETERMINE COMPLIANCE**

4. **Compliance with OAC Rule 3745-27-10 (C)(1), requiring that procedures be used that ensure that consistent and representative samples are collected and representative results are produced, cannot be determined at this time. The City of St. Marys needs to ensure that low turbidity samples are collected from the site's wells. Results from samples collected with excessive turbidities should not be used in background.**

A review of the laboratory turbidity results and field turbidity results where laboratory turbidity results are absent, 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 September 2012 sampling event.

Over the past few sampling events, the owner/operator has modified the purging and sampling procedures. The wells are now purged with peristaltic pumps and sampling occurs immediately following purging, or when enough water is available in wells that are purged dry. Turbidity has shown a decreasing trend in most wells in the past few events. Some of the current results are lower than the historical low values for the individual wells (MW-6, MW-9, AW-4, BW-1, and BW-5). Ohio EPA appreciates and supports this effort. It appears the use of peristaltic pumps and redevelopment of some of the wells is resulting in most wells producing low turbidity samples. A few of the wells, however, appear to not have responded to these changes and still produce higher turbidity readings in general and, in some instances, higher turbidity readings than the historical low values. The agency suggests redevelopment as a possible option to improve these wells. This redevelopment might include the removal of any sediment in the wells and subsequent use of a surge block and continued removal of sediment. Agency inspection of the wells during the recent sampling event, did note that wells MW-4 and BW-4 are leaning to the north above a point about 3 to 5 feet below ground level and well MW-7 displays a loose concrete pad, however; these conditions might not be causing the increased turbidity in these wells. They might benefit from redevelopment.

WELL	LATEST LAB/(field) TURBIDITY (NTU)	LOWEST REPORTED TURBIDITY (NTU)	SAMPLE DATE OF LOWEST TURBIDITY	LATEST TSS (MG/L)
MW-1	<b>110</b>	25	04/02/96	25.5
MW-3	<b>160</b>	50	06/24/97	26
MW-4	<b>160</b>	54	07/28/09	46.5

5. **Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment number 4 above. The City needs to carefully review the detection of a significant number of parameters in the field blanks and explain how the presence and detections of these parameters impacts the analyses of the field samples. The owner/operator needs to implement all necessary changes to procedures to ensure that representative results are provided.**

A review of the QA/QC portion of the TestAmerica analytical report indicates a significant number of inorganic detections in the field blanks. These parameters were both "present" (observed between the PQL and the MDL) and quantified detections. The quantified detections included ammonia and TDS. The estimated values included nitrate/nitrite, sulfate, alkalinity, barium, calcium, copper, iron, manganese, potassium, sodium, and zinc. Field blank two displayed more detections than field blank one. Field blanks are typically prepared with analyte-free water and should result in no detections if field QA/QC procedures are effective. Laboratory blanks also displayed a large number of estimated values. No case narratives were found in the laboratory report which might have described this problem or described procedures for correcting these problems. Often data associated with questionable QC data should not be used in the background.

6. **Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment number 4 above. The City needs to ensure that temporary PQL increases are not utilized in the statistical background. In addition, the City needs to implement a procedure that will ensure that these PQL increases, which are said to be due to matrix interference, do not continue. The owner/operator might need to make changes to analytical methods or sampling procedures to ensure that the lowest PQLs are being utilized.**

In the second paragraph in the Data Review section on page 2 the owner/operator states, "As the result of matrix interferences and/or dilutions, PQLs for several parameters were slightly elevated above the prior analytical PQLs for several monitoring well/parameter combinations as indicated on the laboratory analytical report." Some of these PQLs have only increased recently suggesting that matrix interferences have only recently become a problem. The ground water chemistry does not appear to show this. These recent matrix interferences, and the resulting increases in PQL, need to be investigated. It might be necessary to make corrections in the field or laboratory procedures in order to return to the utilization of the lowest PQLs.

7. **Compliance with OAC Rule 3745-27-10 (C)(7)(c), which requires that when a control chart approach is used to evaluate ground water monitoring data the associated parameter values shall be protective of human health and safety and the environment, also the data distribution and range of concentration values shall be considered, cannot be determined at this time. Compliance data which was removed from the data base should be returned to the data set and the statistical limit should be determined again. The new analyses should be submitted to Ohio EPA prior to the next sampling event.**

Near the top of page 4 of the submittal, the owner/operator states, "The following data point was identified as an outlier and was removed from the data set for the current statistical evaluation."

This statement is followed by a table listing ammonia in well BW-4 with a concentration value of 0.123 mg/L collected July 14, 2010. Based on Table B-14, background for ammonia in well BW-4 includes all values for samples collected between September 15, 1994 and June 20, 2001.

All values subsequent to June 20, 2001 are considered compliance values and should be retained in the database and included in the statistical analyses calculations when Shewhart-CUSUM control charts are utilized. These values should not be removed unless there is a specific reason the data are known to be in error. Since all of the compliance values are utilized in the Shewhart-CUSUM control chart procedure, the removal of data will affect the statistical limit determined by the procedure.

8. **Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment number 4 above. The owner/operator needs to clarify the results of the field parameters and the procedures utilized to obtain those field parameters for well AW-4.**

The field data sheet for well AW-4 indicates the well was purged at 10:42 on September 19, 2012. One volume (0.62 gallons) was purged from the well before it became dry. At that time the field parameters were pH - 6.80 SU, temperature - 15.5 °C, conductivity - 1530 µmohs/cm, dissolved oxygen (DO) - 1.69 mg/L, oxidation reduction potential (ORP) - 69 mV, and turbidity - 1 NTU.

On the following day, September 20, 2012, at 08:00, the well was sampled. At that time, all of the field parameters with the exception of turbidity were exactly the same as recorded at the end of purging approximately 21 hours earlier. Turbidity had increased from 1 NTU to 1000 NTU. These results seem unusual since most of them did not change at all over 21 hours. It would be expected that temperature, DO and ORP might change slightly due to exposure to ambient temperature and exposure to oxygen. Also turbidity increased by three orders of magnitude. It would be expected in a stable environment any turbidity would settle resulting in a lowering of an already low turbidity reading. These anomalies need to be explained.

9. **Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment number 4 above. The owner/operator needs to clarify the results of the field parameters and the procedures utilized to obtain those field parameters for well AW-2.**

The field data sheet for the initial sampling at well AW-2, completed during the September 20, 2012 sampling event indicates significantly different readings compared to the November 1, 2012 resampling event. The readings are listed on the table below.

Date (2012)	Time (24 hr clock)	pH (SU)	Temp (°C)	Cond (µmohs/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Water level (feet)
09/20	0851	6.94	12.4	1430	0	-40	13	13.58
11/01	0944	7.18	9.75	852	2.23	-98	48.6	11.58

The readings between the two dates display high variability. For example, while it is expected that the temperature of the ground water would decrease between late September and early November it is not expected that the conductivity would decrease significantly. Also, while DO increased slightly, ORP decreased considerably. These anomalies need to be analyzed and explained. It is possible a different meter or different calibrations were utilized.

10. **Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment number 4 above. The owner/operator needs to explain the meaning of note "10" on Table B-10 and make necessary changes in all future tables.**

Table B-10 displays the historical analytical results for well AW-4. The table includes a "Notes" section which explains the notes provided in the body of the table. In the column for the September 20, 2012 results note "10" is used seven times for parameters listed as "General" analytes. The "Notes" at the bottom of the table do not contain a definition for note number "10". This needs to be provided in the owner/operator's response and in all future submittals.

## STATEMENTS

11. **Several parameters display exceedances in MW-2, MW-3, and MW-4.** While statistical analyses are not necessary to be performed on assessment wells, the owner/operator notes several exceedances for chloride, sodium, ammonia, and potassium as well as several volatile organic compounds (VOCs) in the assessment wells. It should be noted that several other parameters appear to display exceedances compared to upgradient well MW-1 including, but not limited to, barium, iron, and manganese in MW-2; arsenic, iron, manganese, and nickel in MW-3; arsenic, barium, iron, manganese, and nickel in MW-4. Also, wells AW-1, AW-2, AW-3, MW-7, and MW-8 display chloride levels significantly above upgradient background, and well AW-4 displays a sodium level above upgradient background values.
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. Also, a letter dated July 17, 2009 (5-8504) contained 18 comments; a letter dated February 8, 2010 (5-8901) contained 26 comments; a letter dated July 14, 2010 (5-9362) contained 25 comments, a letter dated December 22, 2010 (5-9773) contained 25 comments, a letter dated November 18, 2011 (5-10577) contained 25 comments; a letter dated February 6, 2012 (5-11196) contained 23 comments; and a letter dated August 3, 2012 (5-11658) contained 17 comments.**

It should be noted that the comments dated February 6, 2012 include one violation relative to the requirement to provide a ground water quality assessment plan as a result of statistically significant increases in chloride at assessment wells BW-5 and BW-6. This issue has also been discussed in an agency letter (5-11422) dated May 29, 2012.

Also included in the February 6, 2012 comment letter is a violation for removal of compliance data from the data set for the statistical analysis of chloride in wells BW-5 and BW-6 using control charts.

No responses have been received from the City. It is important that the owner/operator respond to the agency requests for information and violations.

13. **Wells MW-2, MW-3, MW-4, and MW-5 are affected and in the assessment program.** In the second paragraph on page 1 of the submittal the City states, "As part of the detection monitoring program and in accordance with the facility's Revised Detection Monitoring Sampling and Analysis Plan (DMSAP, last revised April 2009), monitoring wells MW-1 through MW-6 are used to evaluate groundwater quality in the significant saturated units, and monitoring wells BW-1 through BW-6 are used to evaluate groundwater quality in the uppermost aquifer. In accordance with the facility's Groundwater Quality Assessment Plan (GWQAP), last revised April 2009), monitoring wells MW-1 through MW-5 and AW-1 through AW-4 are used to evaluate groundwater quality in the significant saturated units as part of the assessment monitoring program."

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.

14. **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 the first paragraph in the "Data Review" section on page 2 of the submittal 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 statistical dataset. Note that this data was not used in the statistical evaluation and has been excluded from the facility's statistical dataset, but this data is still provided on the summary tables provided in Appendix B."

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.

15. **A review of the historical data for the wells at the site indicates that some of the wells display a possible increasing trend for non-statistical parameters and perhaps a few statistical parameters. This information is shown on the following table.**

WELL	PARAMETERS WITH POSSIBLE INCREASING TREND
MW-6	nitrate/nitrite
MW-1	conductance
AW-1	conductance
AW-3	nitrate/nitrite, chloride, sodium
BW-2	nitrate/nitrite
BW-3	nitrate/nitrite
BW-4	nitrate/nitrite
BW-6	nitrate/nitrite

16. **A review of "Figure 1 Potentiometric Surface Map for the Significant Saturated Units" indicates the values at a pair of wells, which are located relatively close to each other, cause unusual changes in ground water gradient in their immediate area.** In the immediate area of AW-4 and MW-7, the data indicates a local change in gradient from northeast to northwest at these wells. 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').
17. **Sodium in assessment well AW-4 appears to display an increasing trend over time.** The earliest sodium results, collected beginning in December 1995, are in the range of 37 to 54 mg/L. The latest data, collected in the last 6 years, are in the range of 70 to 88 mg/L (87.8 mg/L in November 2011, 75.9 mg/L in April 2012, 71.9 mg/L in September 2012). Well AW-4 is completed in an intermediate zone.
18. **While the presence of an increase in sodium in the sample collected from SZS well MW-1 and chloride in a sample collected from UAS well BW-1 may be indicative of natural variability, it might also be indicative of radial flow from the landfill, errors in sampling or analysis, or damage to the well.** In the fourth paragraph on page 4 the owner/operator states, "A statistical significance was identified for sodium in upgradient monitoring well MW-1 during this sampling event. This statistical significance is the result of either natural variation in groundwater quality that occurs over time, or unfavorable field and/or laboratory conditions at the time of sample collection and/or analysis, and does not require notification to Ohio EPA as it was calculated for an upgradient well." The previous ground water reports for the spring and fall 2011 and spring 2012 events also indicated statistical significance for sodium at well MW-1 and chloride at BW-1.
19. **While the PQL for iron in the laboratory analytical report was greater than typical levels, all of the results for the ground water samples collected were greater than the utilized PQL.** If the typical PQL was utilized, however, the actual concentration of iron in the field blanks might better be determined.
20. **Several wells display significant differences between field turbidity and laboratory turbidity.** For example, the field turbidity for well MW-4 is stated to be 5.00 NTU while the laboratory turbidity is stated to be 160 NTU. Also the field turbidity for well AW-3 is stated to be 1.00 NTU while the laboratory turbidity is stated to be 70 NTU; and at well MW-3, the field turbidity is 3.00 NTU and the laboratory turbidity is 160 NTU.

21. It is possible that the field turbidity is in error and not representative, the laboratory turbidity is in error and not representative, or both the field and laboratory turbidity values are in error and not representative. While turbidity is not a statistical parameter, the presence of turbidity can significantly impact the results for other parameters including many metals.

Ohio EPA understands that the owner/operator intends to no longer perform laboratory turbidity analyses. The owner/operator is reminded that even if there may no longer be laboratory turbidity results, the problem of potential errors in turbidity readings might continue to exist. It is important that this issue be addressed. Ohio EPA also understands that the owner/operator believes the problem is due to laboratory error due to the laboratory not shaking the bottles prior to turbidity analysis. Not agitating the bottles could produce lower results than expected if clearer water is analyzed and not greater values as shown in the current and previous results.

The owner/operator is encouraged to consider the potential that the field procedure is resulting in this striking difference in turbidity. Often the last field parameter readings collected during purging are the field parameter readings for the sampling event when sampling immediately follows purging. At this landfill a separate sample was collected for turbidity. It is not known when this sample was collected; but unpreserved samples are typically collected at or near the end of the sampling event in any particular well. If the analytical procedures, field or laboratory, were both performed correctly, it could be that the sample collected later was more turbid than the sample collected at the beginning of the sampling procedure. If this is true, the disparity in turbidity values might be indicative of the need for additional redevelopment in that well.

21. **Samples have been collected from well AW-2, located about 200' north northeast of and downgradient of affected well MW-2, since about 1995. No volatile organic compounds have been consistently observed in the well until vinyl chloride was observed during the April 2012 and now during the September 2012 events. Resampling during both the spring 2012 and fall 2012 events confirmed the presence of vinyl chloride in the ground water samples collected from this well.**
22. **Table B-8, which provides the historical analytical results for well AW-2 indicates that the concentration of vinyl chloride determined for the fall 2012 resampling event was 14 µg/L. The laboratory report indicates the value was 1.14 µg/L. The Table B-8 value might be in error.**
23. Tables B-17, B-18, and B-19 contain a parameter listed as "Magnesium". This appears to be a typographical error. The table would be clearer if the error was corrected.
24. **Tables B-17, B-18, and B-19 contain a row of data in the metals section labeled "Sodium, Dissolved". The latest result in this row indicates a concentration <0.0005 mg/L (P), with "P" indicating the parameter is presented between the PQL and the MDL. This is unusual given the parameter and the presence of another row, located below, labeled "Sodium, Dissolved".**

In addition, the metals section does not contain a row for parameter Silver, even though the analytical report indicates this parameter was analyzed and utilized a PQL of 0.005 mg/L. The row label "Sodium, Dissolved" in the metals section could be a typographical error and might need to be "Silver, Total". Correction would be helpful in understanding the results.

25. **A review of statistical analyses charts indicates a potential change occurring in sodium concentrations following 2004. The charts indicate an increase in sodium concentration beginning with the January 2005 sampling event.** This increase appears to occur for many, albeit not all, of the wells. A general change in concentration across a number of wells is suggestive of a global change in method, perhaps a change in laboratory, laboratory procedures, or equipment. It would be helpful to investigate this change relative to increasing sodium trends and potential future exceedances in sodium. If a general change had occurred, it might be appropriate to move the background window forward.
26. While it is not necessary to perform statistical analyses on wells in the assessment program, it should be mentioned that based on statistical parameters a number of these wells continue to display exceedances based on a comparison to interwell prediction limits. Also, while not included in the monitoring plan as yet, it appears that two of the three additional wells display exceedances compared to the upgradient well MW-1 using prediction limit analysis. All of these wells are completed in one of the significant zones of saturation. Following is a table of these exceedances:

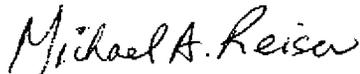
WELL	EXCEEDANCE
MW-2	Ammonia, Chloride, Potassium, Sodium, VOC
MW-3	Ammonia, Chloride, Sodium, VOC
MW-4	Chloride, Sodium, VOC
MW-5	Chloride
AW-1	Chloride
AW-2	Ammonia, Chloride, VOC
AW-3	Ammonia, Chloride
AW-4	Sodium
MW-7	Chloride
MW-8	Chloride

The owner/operator must immediately take the necessary measures to return to compliance with Ohio's environmental laws. Within 14 days of receipt of this letter, the owner/operator is requested to provide documentation to this office including the steps that will be taken to abate the violations cited above. Documentation of the steps taken to return to compliance include written correspondence, updated policies, and photographs, as appropriate, and may be submitted via the postal service or electronically to [mike.reiser@epa.ohio.gov](mailto:mike.reiser@epa.ohio.gov).

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If you have any questions feel free to contact me at 419-373-3126.

Sincerely,



Michael A. Reiser, R.S.  
Environmental Supervisor  
Division of Materials and Waste Management

/cg

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