OhioEPA

State of Ohio Environmental Protection Agency

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Ted Strickland, Governor
Lee Fisher, Lieutenant Governor
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Re: Report of Ground Water Quality
Spring 2006 Sampling Event
Hardin County Landfill, Hardin County

January 10, 2007

Hardin County Commissioners
One Courthouse Square
Suite 100
Kenton, Ohio 43326

Dear Commissioners:

The Ohio Environmental Protection Agency (Ohio EPA) has reviewed the submittal received on August 28, 2006 for the Hardin County Landfill (facility). This submittal was titled, "Report of Groundwater Quality for the Spring 2006 Semi-annual Detection and Compliance Monitoring Event: Hardin County Landfill." The submittal presented the results of the June 14 and 15, 2006 semiannual sampling event and the July 21, 2006 resampling event. Ohio EPA comments follow.

COMMENTS

VIOLATIONS

1. OAC Rule 3745-27-10 (B)(1)(a) and (b), OAC Rule 3745-27-10 (C)(4), OAC Rule 3745-27-10 (C)(6), OAC Rule 3745-27-10 (C)(8): The owner/operator continues to be in violation of OAC Rule 3745-27-10 (B)(1)(a) and (b), OAC Rule 3745-27-10 (C)(4), OAC Rule 3745-27-10 (C)(6), and OAC Rule 3745-27-10 (C)(8). OAC Rule 3745-27-10 (B)(1)(a) and (b) require that, "The ground water monitoring system, for detection monitoring, assessment monitoring, or corrective measures, shall consist of a sufficient number of wells, installed at appropriate locations and depths, to yield ground water samples from both the uppermost aquifer system and any significant zones of saturation that exist above the uppermost aquifer system that do the following: (a) Represent the quality of the background ground water that has not been affected by past or present operations at the sanitary landfill facility. (b) Represent the quality of the ground water passing directly downgradient of the limits of solid waste placement."

   OAC Rule 3745-27-10 (C)(4) requires that, "The owner or operator shall establish background ground water quality..."

   OAC Rule 3745-27-10 (C)(6) requires that, "Within ninety days of completing collection of the eight background samples... the owner or operator shall specify one of the following statistical methods to be used in evaluating ground water monitoring data."

OAC Rule 3745-27-10 (C)(8) requires that, "The owner or operator shall determine whether or not there is a statistically significant increase over background for each parameter or constituent required to be statistically analyzed within the ground water monitoring program."

The owner/operator claims that ground moraine well GMW-2R, a replacement well for GMW-2/P-1, is an "upgradient" well. Ohio EPA does not agree with this position and considers this well to be downgradient. In addition, the owner/operator has not performed statistical analyses on this well since mid 2003. Prior to this time, the owner/operator considered this well to be downgradient and performed intrawell statistical analyses semiannually. Ohio EPA performed statistical analyses using intrawell Shewhart-CUSUM control charts utilizing the first eight values as background, with apparent outliers removed, for chloride, sodium, potassium and ammonia-nitrogen data collected through the Spring 2006 semiannual sampling event. All four parameters display statistically significant increases over background. Some have displayed these statistically significant increases over background for some time. For example, chloride displays exceedances dating back to the October 2003 data.

Since the chemical anlayses and statistical analyses of the samples from well GMW-2/GMW-2R indicate that they are affected by past or present operations, they cannot be considered background or upgradient. The owner/operator continues to be in violation of OAC Rule 3745-27-10 (B)(1)(a) and (b) by not providing a proper background well for the ground moraine zone and by not properly analyzing well GMW-2R as a downgradient well.

The owner/operator continues to be in violation of OAC Rule 3745-27-10 (C)(4) by not properly establishing background ground water quality for affected downgradient well GMW-2/P-1 and the replacement well GMW-2R. Because the results show the well to be affected by the landfill, well GMW-2/GMW-2R is downgradient of the landfill and should be treated as such.

The owner/operator has not specified a statistical method for well GMW-2/GMW-2R. The owner/operator continues to be in violation of OAC Rule 3745-27-10 (C)(6) by not specifying a statistical method for affected downgradient well GMW-2R.

The owner/operator has not determined whether there is or is not a statistical significant increase. The owner/operator continues to be in violation of OAC Rule 3745-27-10 (C)(8) by not determining the presence of a statistically significant increase over background for well GMW-2/P1 and replacement well GMW-2R.

The owner/operator needs to comply with the above-referenced rules.

2. OAC Rule 3745-27-10 (A)(1), OAC Rule 3745-27-10 (B)(4)(a) and (b): The owner/operator is in violation of OAC Rule 3745-27-10 (A)(1) and OAC Rule 3745-27-10 (B)(4)(a) and (b). OAC Rule 3745-27-10 (A)(1) requires that, "In accordance with the schedule in paragraphs (A)(2) and (A)(3) of this rule, the owner or operator of a sanitary landfill facility shall implement a groundwater monitoring program capable of determining the impact of the facility on the quality of ground water occurring within the

uppermost aquifer system and all significant zones of saturation above the uppermost aquifer system underlying the sanitary landfill facility." OAC Rule 3745-27-10 (B)(4)(a) and (b) requires that, "The number, spacing, and depth of ground water monitoring wells shall be as follows: (a) Based on site specific hydrogeologic information including that information listed in paragraphs (C)(3)(a) to (C)(3)(g) of rule 3745-27-06 of the Administrative Code. (b) Capable of detecting a release from the sanitary landfill facility to the ground water at the closest practicable location to the limits of solid waste placement."

Comment number 3 in a letter to the owner/operator dated September 16, 2005 from Ohio EPA provided significant detail relating to the position of well GMW-2R relative to the source of waste-derived constituents. The agency concluded, "In order to determine compliance with OAC Rule 3745-27-10 (A)(1) and OAC Rule 3745-27-10 (B)(4)(a) and (b) the owner/operator needs to document a source other than the landfill for the contamination observed in the ground moraine zone. If the owner/operator does not definitively document an ultimate source other than the landfill, the owner/operator will be in violation of OAC Rule 3745-27-10 (A)(1) and OAC Rule 3745-27-10 (B)(4)(a) and (b). By claiming well GMW-2R is upgradient, while data indicate that it is downgradient and affected, the owner/operator cannot determine the impact of the landfill on the ground moraine zone as required by OAC Rule 3745-27-10 (A)(1) . Also, claiming well GMW-2R is upgradient ignores site specific hydrogeologic information in choosing the number, spacing, and depth of the ground water monitoring wells as required by OAC Rule 3745-27-10 (B)(4)(a). In addition, by claiming affected well GMW-2R is upgradient, statistics are not performed and the owner/operator is not capable of detecting a release from the sanitary landfill facility as required by OAC Rule 3745-27-10 (B)(4)(b). If a source other than the landfill is not determined, then well GMW-2R should be considered downgradient and proper statistics performed. If these statistical procedures show significant increases then the facility should determine full rate, extent, and concentration." The owner/operator has not responded to that request.

Also, the June 2006 event analytical results for well GMW-2R indicate that the concentrations of waste-derived constituents chloride (470 mg/L), sodium (188 mg/L) and potassium (6.4 mg/L) have decreased slightly, but are still excessive. In addition, the concentration of ammonia-nitrogen (4.0 mg/L) has now displayed another increase over historical values. Well GMW-2R is obviously an affected well located downgradient from the landfill which is the source of the waste-derived constituents observed in the samples. The owner/operator continues to be in violation of OAC Rule 3745-27-10 (A)(1) and OAC Rule 3745-27-10 (B)(4)(a) and (b) for the reasons discussed above.

3. OAC Rule 3745-27-10 (B)(4)(a) and (b): The owner/operator is in violation of OAC Rule 3745-27-10 (B)(4)(a) and (b). For rule citation see comment 2 above.

A review of Figure 3.0, "Potentiometric Surface Map for the Uppermost Aquifer System" indicates that well BW-2R is not properly honored. The 953.60' line is too far from well BW-2R which has an elevation value of 953.67'. If adjustments are made, the resulting map would indicate flow lines from under the landfill toward the southeast and south sides of the landfill where there are no program monitoring wells. Currently, the monitoring program only requires that uppermost aquifer system wells BW-1 (upgradient), BW-3R and BW-5 be sampled.

The owner/operator is in violation of OAC Rule 3745-27-10 (B)(4)(a) and (b) for not having a monitoring system based on site-specific hydrogeologic information and for not having a monitoring system capable of determining a release from the landfill at the closest practicable location to the limits of solid waste. The owner/operator needs to review the referenced map and data, make necessary corrections and resubmit the map for review. If indicated, the number and spacing of wells should be modified to establish an adequate monitoring system. A similar comment was made relative to this issue regarding the Spring 2005 and Autumn 2005 sampling events.

MORE INFORMATION NEEDED TO DETERMINE COMPLIANCE

4. OAC Rule 3745-30-08(C)(1) and (C)(2)(d): Compliance with OAC Rule 3745-30-08(C)(1) and (C)(2)(d) cannot be determined at this time. OAC Rule 3745-27-10(C)(1) requires that, "The ground water monitoring program shall 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 installed in accordance with paragraph (B), (D), (E), or (F) of this rule. ". Further, OAC Rule 3745-27-10(C)(2)(d) requires that the SAP document the procedures for performance of field analysis.

   According to the SOP #1901 in the facility Detection Monitoring Sampling and Analysis Plan page 3, item 7, "Evacuate three casing volumes (3V) or until pH, temperature, and conductivity stabilize." There are no details relating to the determination of when stabilization occurs.

   Based on review of current technical literature, Ohio EPA now considers the criteria for stabilization of these field parameters to be ±0.1 S.U. for pH, ±3% for conductivity, ±0.5°C for temperature and ±10% for turbidity (when turbidity is >10 NTU).

   To assure compliance with OAC Rules 3745-27-10(C)(1) and (C)(2)(d) in the future, the owner/operator needs to do one of the following:

   ▸ revise the SAP to document the new field parameter stabilization criteria noted above, followed by field implementation;

   OR

   ▸ demonstrate to Ohio EPA how the current field parameter stabilization criteria in the SAP meet the requirements of OAC Rule 3745-27-10(C)(1).

5. OAC Rule 3745-27-10(C)(1): Compliance with OAC Rule 3745-27-10(C)(1) cannot be determined at this time. For rule citation for OAC Rule 3745-27-10 (C)(1) see comment number 3 above.

   A review of the field data sheets indicates that all wells were purged on either June 14 or June 15, 2006 and many of the wells were sampled immediately after purging. Some of the wells, however, including CMW-3, GMW-1 and GMW-4, were sampled the next day after purging (June 15, 2006). Interestingly, well CMW-3, which in June was sampled

about 22.5 hours after purging, was sampled only about 4.5 hours after purging in the July resampling event. It is understood that several wells recharge slowly and it might take several hours before enough water is available for sampling. Well CMW-3, for example, produced enough water in July to sample within a few hours after purging. OAC Rule 3745-27-10 (C)(1) requires that procedures be used which will produce representative samples. This usually means that samples are collected as soon as enough water is available for sampling. Waiting as much as 22.5 hours to sample a well which had recharged shortly following purging could result in samples of "stagnant" water and would not result in representative samples.

In order to determine compliance with OAC Rule 3745-27-10 (C)(1) and (C)(1)(d) the owner/operator needs to provide documentation when the wells recharged sufficiently to collect a sample. Wells should be sampled as soon as enough water is available in the well to sample. If this data is not available for the Spring 2006 event, it should be collected from subsequent events to determine when there is enough water to sample. Sampling should then proceed.

6. OAC Rule 3745-27-10 (C)(7)(e): Compliance with OAC Rule 3745-27-10 (C)(7)(e) cannot be determined at this time. This rule requires that, "The statistical method shall account for data below the limit of detection with one or more statistical procedures that ensure protection of human health and the environment. Any practical quantitation limit (PQL) used in the statistical method shall be the lowest concentration level that can be reliably achieved within the specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility."

A review of the laboratory analytical reports indicates that some of the practical quantitation limits PQLs utilized were greater than those typically utilized by other laboratories in Ohio. Following is a table of the parameters and PQL values utilized by the owner/operator's laboratory which appear to be greater than those utilized by other laboratories.

PARAMETER	TEST AMERICA PQL (µg/L)	TYPICAL PQL (µg/L)
Acrylonitrile	20 µg/L	5 µg/L
Arsenic	5 µg/L	3 µg/L
Barium	50 µg/L	10 µg/L
Beryllium	3 µg/L	2 µg/L
Copper	50 µg/L	10 µg/L
Iron	100 µg/L	50 µg/L
Sodium	5 mg/L	1 mg/L
Antimony	5 µg/L	3 µg/L
Vanadium	50 µg/L	20 µg/L

In order to determine compliance with OAC Rule 3745-27-10 (C)(7)(e) the owner/operator needs to use PQL values which are the lowest concentration level that can be reliably achieved within the specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility and will provide an accurate representation of the ground water of the site. The owner/operator needs top document why the "typical" laboratory PQL listed above cannot be utilized at the facility or begin using the lower values.

7. OAC Rule 3745-27-10(C)(1): Compliance with OAC Rule 3745-27-10(C)(1) cannot be determined at this time. For rule citation for OAC Rule 3745-27-10 (C)(1) see comment number 3 above.

   A review of the Historical Groundwater Quality Data Summary Tables in Appendix D indicates a statement on the bottom of the tables which states, "See attached table for applicable notes." This table cannot be found. It appears certain concentration values were included or excluded from background and the reasons were discussed in the referenced table.

   In order to determine compliance with OAC Rule 3745-27-10 (C)(1) the owner/operator needs to provide the reasons for inclusion or exclusion of data. Submission of the referenced table would be acceptable.

8. OAC Rule 3745-27-10 (C)(1): Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment 3 above.

   A review of the laboratory analytical reports indicates that the method detection limit (MDL) for silver is 0.0021 mg/L and the reporting limit, said to be equal to the practical quantitation limit (PQL), is 0.0020 mg/L. This means that the concentration at which silver can be detected, but not quantified, is greater than the concentration at which silver can be quantified. This appears to be an error.

   In order to determine compliance with OAC Rule 3745-27-10 (C)(1) the owner/operator needs to correct the error or explain how the MDL is greater than the PQL. This comment was also made in response to the Autumn 2005 data submittal.

9. OAC Rule 3745-27-10 (C)(1): Compliance with OAC Rule 3745-27-10 (C)(1) cannot be determined at this time. For rule citation see comment 3 above.

   In appendix E, Figure 1.0 (B) shows that the data at wells P-9, AW-5F, P-10, and AW-5J may not be properly honored. For example, well AW-5J displays a ground water elevation of 953.56', but, based on the map, is located downgradient of well P-10, which has the same ground water elevation of 953.56'. Based on the data, well P-10 should be on strike with well AW-5J. In order to determine compliance with OAC Rule 3745-27-10 (C)(1) the owner/operator needs to show how the maps are representative of conditions at the site or re-draw the maps and send copies to Ohio EPA. A similar comment has been made previously.

COMMENTS ON PREVIOUS INFORMATION REQUESTS

10. Regarding the review of the January 24, 2005 report of ground water quality, Ohio EPA made the following comment. The agency has not yet received the requested information. Again, this information is requested.

OAC Rule 3745-27-10 (C)(7)(e): Compliance with OAC Rule 3745-27-10 (C)(7)(e) cannot be determined at this time. For rule citation see comment number 1 above.

On pages 4 and 5 of the submittal the owner/operator states, "Since initiation of the groundwater monitoring program, groundwater samples collected at the facility pursuant to the OAC regulations have been analyzed by more than one laboratory. As a result, different PQLs have been used to analyze ground water samples. Hardin County requested that STL, the current laboratory providing analytical services for the facility, provide a list of their routine PQLs and MDLs for those parameters required to be analyzed under the OAC regulations. The PQLs provided by STL and used for the Fall 2004 event meet the Ohio EPA definition provided in the December 28, 2004 letter, as documented by STL in a letter provided in Appendix B."

While there is a statement from the current laboratory documenting that the RL for the Fall 2004 data is equivalent to the Ohio EPA definition of PQL, there is no laboratory documentation that previous RL values are equivalent to laboratory PQLs. In order to determine if all of the historical RLs used in the background data base are truly PQLs, the owner/operator needs to provide documentation produced by the laboratories which indicate that the RLs are equivalent to PQLs as defined by Ohio EPA.

RECOMMENDATIONS

No action on the part of the owner or operator is required by rule to address the following recommendations. However, in Ohio EPA's opinion, the recommendations will improve the clarity of the referenced document and/or reduce further misunderstandings between Ohio EPA and the facility owner/operator.

11. Table B-1, "Summary of Estimated Parameters for the Spring 2006 Event" indicates that the field blank and the trip blank reported estimated concentrations of volatile organic compounds and metals. It is recommended the owner/operator review their field and laboratory procedures relative to handling and preparation of these blanks.

STATEMENTS

12. SOP #1902 of the site's sampling and analysis plan indicates that, "A Chain-of-Custody Form should be filled out and completed for each cooler of samples transported to the laboratory for analysis..." A review of the chain-of-custody forms indicates that the temperature of the cooler upon arrival section of the form was not completed or was not completed properly. It was noted, however, that the temperature of the cooler upon arrival at the laboratory was provided on the "STL Cooler Receipt Form/Narrative North Canton Facility".

13. On page 6 of the submittal the owner/operator states, "Intra-well statistics were performed on the southwest ground moraine granular zone. Based on the March 2002

Groundwater Assessment and Hydrogeologic Evaluation Report (GWAHER), monitoring wells GMW-1 and GMW-2 have been identified as upgradient monitoring points for this zone and were added to the groundwater detection monitoring network with the October 2003 revision of the DMSAP."

Even though the owner/operator may have stated that GMW-1 and GMW-2 (formerly known as P-1) were upgradient wells, they continued to perform intrawell statistical analyses on well P-1 through the analysis of the April 2003 sampling event data. In addition, during this time, P-1 was labeled as a downgradient well. Sen's slope analysis by Ohio EPA indicates that the chloride data for well P-1 displays an increasing slope which becomes statistically significant with the addition of the April 2003 data.

With the October 2003 sampling event, an even greater value (22 mg/L) for chloride was observed in this well. The owner/operator did not perform statistical analysis from this time onward and noted P-1 as an upgradient well in the reports of ground water quality. Intrawell Shewhart-CUSUM control chart analysis performed by Ohio indicates that the October 2003 value of 22 mg/L for chloride represents a statistically significant increase compared to historical background. The owner/operator did not perform statistical analyses on data from wells GMW-1 and GMW-2 for the current sampling event. (See comment #2.)

14. Previously, the agency made a statement relating to the nitrate-nitrite concentrations in wells CMW-4, CMW-5 and AW-13. The nitrate-nitrite levels in well CMW 4 have now decreased to 0.3 mg/L for the June 2006 event with the previous result being 1.5 mg/L. Well CMW-5 has decreased to 1 mg/L from 2.3 mg/L. The 1 mg/L concentration is still greater than the October 2003 value of 0.13 mg/L. Well AW-13 was not sampled in this event.

15. In appendix E, Figure 2.0 (A) displays an interpretation of the ground water elevation data from four of the ground moraine zone wells located in the southwest corner of the site. It should be noted that based on the paucity of wells in this zone, the ground moraine sand zone may be present under almost all of the landfill.

16. On page 1 of the submittal the owner/operator states, "Finally, this document provides documentation of sampling and analysis activities associated with the compliance monitoring event completed during the Spring 2006 event consistent with the facility's Ohio EPA approved Corrective Measures Plan (CMP)." It should be noted that the "compliance monitoring" referenced by the owner/operator is not the compliance monitoring consistent with OAC Rule 3745-27-10 (E)(8), the Compliance Monitoring Plan.

17. On page 3 of the submittal the owner/operator states, "As discussed in Section 1.0, groundwater samples were collected from the following detection monitoring wells: GMW-1, GMW-2R, GMW-3 and GMW-4 installed in the southwest ground moraine granular zone; and BW-1, BW-3R and BW-5 installed in the uppermost bedrock aquifer." It should be noted that Ohio EPA does not and has not concurred that well GMW-2R is in the detection monitoring program. This well is both affected by the landfill and is located downgradient from the contaminant source.

18. On page 3 and 4 of the submittal the owner/operator states, "Hardin county believes that the change in elevation at compliance monitoring well CMW-3 likely occurred during installation activities for the supplemental corrective measures, and is also reason to suspect that the integrity of the well has been compromised. Hardin County intends to decommission CMW-3 and re-install a replacement well in the near future." Ohio EPA may wish to observe the decommissioning of well CMW-3 and installation of its replacement. For this reason the agency requests early notification of this field work.

19. On page 10 the owner/operator indicates that nitrate-nitrite and manganese in well CMW-2 is above historical ranges. They also indicate that barium, chloride, sodium and chemical oxygen demand (COD) in well CMW-3 are above historical ranges. These two wells are located in the southeast corner of the facility.

20. On page 11 the owner/operator indicates that the concentration of sodium in wells CMW-2 through CMW-5 exceeds the remediation standard of 25 mg/L. The concentration of sodium in the upgradient well, CMW-1 continues to remain below the remediation standard of 25 mg/L. The sodium concentrations in CMW-1 range from 11.9 mg/L to 15 mg/L.

21. Regarding the presence of sodium concentrations in excess of the remediation standard, on page 12 the owner/operator states, "Once more data are collected, Hardin county may evaluate the data for spatial variability." The owner/operator is cautioned that the data already appear to indicate the presence of spatial variability in that the upgradient well CMW-1 does not indicate exceedance of the remediation standard while the four downgradient wells CMW-2 through CMW-5 display higher sodium concentrations which exceed the remediation standard.

22. In the submittal the owner/operator discusses the "compliance monitoring ground water quality data" and concludes, "...the cutoff wall and dewatering system continue to have a positive affect on groundwater quality in the flood plain/end moraine zone." The owner/operator does not, however, provide discussion of the hydraulic monitoring required by the corrective measures program. A review of the data and potentiometric surface maps of the flood plain/end moraine zone by Ohio EPA indicates that along about 62% of the low permeability wall the water levels are higher outside the wall than inside the wall and along about 37% of the low permeability wall the water levels are higher inside the wall than outside the wall. If the wall and the dewatering system are completely effective the water levels outside the wall will be higher than inside the wall along 100% of the wall distance.

23. An analysis of the historical sodium values for well GMW-1 by Ohio EPA indicates a statistically significant trend. The Mann-Kendall value was 28 and the critical values was 27. While the concentrations are much less than in affected well GMW-2R the increasing trend might be suggestive of a slight impact by the landfill. In addition, this increasing trend should be investigated since intrawell background should not automatically be updated if this exists.

If you have any questions, 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 Mike Reiser, Division of Solid and Infectious Waste Management, Ohio EPA Northwest District Office, 347 North Dunbridge Road, Bowling Green, Ohio 43402.

Sincerely,

Michael A. Reiser

Michael A. Reiser, R.S.
Environmental Specialist
Division of Solid and Infectious Waste Management

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pc: Mr. David Zeller, Hardin County Health Department
Mr. Tom Covrett, Mannik & Smith Group,Inc.
Mr. Jack Leow, DDAGW, NWDO
Mr. Randy Skrzyniecki, DDAGW, NWDO
File: Hardin County; Hardin County Landfill; Ground Water

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