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**FALL 2008 SEMIANNUAL WATER QUALITY
MONITORING REPORT**

**MADISON COUNTY CLOSED MUNICIPAL SOLID WASTE
LANDFILL**

MADISON COUNTY, NORTH CAROLINA

Prepared for
Madison County, North Carolina

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1.0 INTRODUCTION

The Madison County Solid Waste Department maintains a closed municipal solid waste landfill (Closed Landfill) located near the intersection of US Highway Bypass 25/70 and Long Branch Road (State Route 1582) in Madison County, North Carolina (Figure 1). The permit for the landfill requires semiannual monitoring of groundwater and surface-water quality. This report describes the second groundwater and surface-water quality sampling event conducted in 2008. This report is being submitted in accordance with monitoring requirements for closed landfills as stipulated in the North Carolina Department of Environment and Natural Resources (DENR) Division of Waste Management (DWM) Permit No. 58-02 issued to the Madison County Waste Department.

This semiannual report provides an evaluation of groundwater and surface water quality for the Madison County Closed Landfill (Closed Landfill).

This report contains the following items:

- Groundwater level measurements
- An illustration of groundwater and surface-water sampling locations
- Groundwater and surface-water quality analytical results
- Sampling logs
- Laboratory analytical reports with chain-of-custody documentation

2.0 METHODS

Closed Landfill monitoring wells (5802-MW-01-OLD and 5802-MW-02-OLD), the background spring (5802-BG-SPRING-OLD), surface-water sample locations (5802-SW-01-OLD and 5802-SW-02-OLD), and domestic wells (DW-01-EDWARDS and DW-02-EDWARDS) were sampled by Altamont Environmental, Inc. (Altamont) personnel on October 15 and 17, 2008. Approximate sample locations are depicted on Figure 2.

The water samples collected from the 5802-BG-SPRING-OLD sampling location is treated as a groundwater sample for the following reasons:

- The sampling point does not discharge groundwater to the ground surface.
- Construction of the sample access point is similar to a temporary monitoring well or piezometer.
- The sampling point is constructed of PVC casing extending below ground surface and is assumed to have a screened interval from which ground water is collected and recharges.

Prior to collecting groundwater samples from the monitoring wells, the static water level and total depth of the wells were measured and recorded in order to calculate a well or boring volume. At each sample location, an initial round of field parameters consisting of pH, specific conductivity, dissolved oxygen, oxidation reduction potential, turbidity, and temperature were also collected. Water-level measurements and field parameters are included in Table 1. Groundwater sampling points were then purged with a disposable bailer. Generally, as each consecutive well volume was removed with the bailer, an additional round of groundwater parameters was recorded. Well purging continued until these parameters stabilized (three successive readings in which pH measurements fell within +/- 0.1 units; specific conductivity measurements fell within +/- 3 percent; temperature measurements fell within +/- 10 percent; and ORP measurements fell within +/- 10 millivolts) or the well was bailed dry and allowed to recharge.

The PVC casing associated with 5802-BG-SPRING-OLD contained an obstruction about 11.8 feet below the top of the casing. On October 16, 2008, it was purged until the water level was at or below the obstruction. Then, on October 17, 2008, initial groundwater parameters were measured and the groundwater sample was collected. (Altamont will make efforts to remove this obstruction prior to the spring 2009 semiannual sampling event.)

One set of field parameters and a groundwater sample were collected from each of two residential drinking-water wells adjacent to the site. Field parameters were recorded and a groundwater sample was collected from each well after approximately 30 gallons of groundwater was purged using the dedicated pumps existing in each of the wells. The groundwater sample from DW-01-EDWARDS was collected from the spigot in the basement because a spigot does not exist at the wellhead. The groundwater sample from DW-02-EDWARDS was collected from the spigot at the wellhead.

Surface-water samples 5802-SW-01-OLD and 5802-SW-02-OLD were collected at designated locations along Profitt Branch, which flows adjacent to the site south and westward (Figure 2). The surface-water sample collected at the 5802-SW-01-OLD location represents surface-water quality upstream of the closed landfill, while the surface-water sample collected at the 5802-SW-02-OLD location represents surface-water quality downstream of the closed landfill. One set of field parameters, including temperature, pH, specific conductivity, dissolved oxygen, oxidation reduction potential, and turbidity, was measured and recorded at each surface-water sampling location prior to sample collection (Table 1).

Field parameters and additional observations pertaining to the Closed Landfill sampling locations are provided on the sampling logs included in Appendix A. Water-level measurements and field parameters are also included in Table 1. Following sample collection, groundwater and surface-water samples were immediately placed on ice in sample coolers for transport to Pace Analytical Laboratories (Pace), a North Carolina certified laboratory located in Asheville, North Carolina. All samples were analyzed for Appendix I volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260, and eight Resource Conservation and Recovery Act (RCRA) metals using EPA Methods 6010 and 7470. Proper chain-of-custody documentation was followed during collection and shipment of each sample. Laboratory reports and chain-of-custody documentation are included in Appendix B.

3.0 FINDINGS

Laboratory analytical results for the groundwater and surface-water samples collected at the Closed Landfill are compiled in Table 1, which is displayed in the Electronic Data Deliverable (EDD) format specified by the Solid Waste Section memorandum dated October 27, 2006. The laboratory analytical report issued by Pace for this sampling event is included as Appendix B.

As stipulated in the memorandum referenced above, non-detections, that is, concentrations below the laboratory-specific Method Detection Limit (MDL), were reported as “Below Quantitation Limits” (BQLs), and all concentrations exceeding the laboratory-specific MDLs were reported and appropriately qualified (see Tables 1 through 3). The MDL is the minimum concentration of a substance that can be measured and reported by a laboratory with 99% confidence that the analyte concentration is greater than zero. All detections were compared to analyte-specific Solid Waste Section Limits (SWSLs) established by the NC Solid Waste Section. The SWSL is the lowest concentration of an analyte in a sample that can be quantitatively determined with suitable precision and accuracy. If the reported concentration is below the SWSL and above the laboratory MDL, then the analytical result is qualified as estimated. These results are flagged with a “J” qualifier (J-flag) in Table 1.

Detected concentrations of analytes in groundwater samples were compared to the standard from the North Carolina Administrative Code (NCAC) Title 15A, Subchapter 2L groundwater quality standards (2L Standard; 15A NCAC 2L.0202). Detected concentrations of analytes in groundwater without established 2L Standard were compared to the Groundwater Protection Standard (GWPS) pursuant to 15A NCAC 13B.1634. Detections of analytes in surface-water samples were compared to the standard from the NCAC Title 15A, Subchapter 2B surface-water quality standards (2B Standard; 15A NCAC 2B.0200s).

3.1 GROUNDWATER – MONITORING WELLS

Analytical results for groundwater samples collected from monitoring wells and 5802-BG-SPRING-OLD are discussed below. Analytical results are summarized in Tables 1 and 2. The laboratory reports are included in Appendix B.

Appendix I Metals (US EPA Methods 6010, 6020, and 7470)

Four metals (barium, chromium, selenium, and silver) were detected in one or more of the groundwater samples (5802-BG-SPRING-OLD, 5802-MW-01-OLD, and 5802-MW-02-OLD) at concentrations below their respective SWSLs. These analytical results are qualified with a J-flag, and are shown in Table 1.

Metals detected at concentrations above the associated SWSL but below the applicable 2L Standard or GWPS (Table 2):

- Barium in 5802-SPRING-BG-OLD (152 µg/l) and 5802-MW-01-OLD (220 µg/l)

Metals detected at concentrations above the applicable 2L Standards or GWPS:

- None

Appendix I VOCs (US EPA Methods 8260)

Seven VOCs (acetone, 1,1-dichloroethane, 1,4-dichlorobenzene, 2-butanone, chlorobenzene, chloroethane, and chloromethane) were detected only at estimated concentrations (J-flags) below their SWSLs in groundwater samples collected from 5802-MW-01-OLD and 5802-MW-02-OLD.

VOCs detected at concentrations above the associated SWSL but below the applicable 2L Standard or GWPS:

- None

VOCs detected at concentrations above the associated 2L Standard or GWPS:

- None

3.2 SURFACE WATER:

Analytical results for surface-water samples collected from Profitt Branch are discussed below. Analytical results are summarized in Table 1. The laboratory reports are included in Appendix B.

Appendix I Metals (US EPA Methods 6010, 6020, and 7470)

Three metals (barium, chromium, and silver) were detected in one or both of the surface-water samples (5802-SW-01 and 5802-SW-02) only at concentrations below their respective SWSLs. These analytical results are qualified with a J-flag, and are shown in Table 1.

Metals detected at concentrations above the associated SWSL but below the applicable 2B Standard:

- None

Metals detected at concentrations above the applicable 2L Standards or GWPSs:

- None

Appendix I VOCs (US EPA Methods 8260)

Two VOCs (acetone and 2-butanone) were detected in the surface-water sample 5802-SW-02-OLD at estimated concentrations below their SWSLs.

VOCs detected at concentrations above the associated SWSL but below the applicable 2B Standard:

- None

VOCs detected at concentrations above the associated 2B Standard:

- None

3.3 GROUNDWATER--DOMESTIC WATER WELLS

Analytical results for the two domestic water well samples, DW-1-EDWARDS and DW-02-Edwards, are discussed below. Analytical results are summarized in Table 1. The laboratory reports are included in Appendix B.

Appendix I Metals (US EPA Methods 6010, 6020, and 7470)

Three metals (chromium, selenium, and silver) were detected in one or both of the groundwater samples collected from the residential drinking water wells only at concentrations below the metals' respective SWSLs (J-flags; Table 1).

Metals detected at concentrations above the associated SWSL but below the applicable 2L Standard or GWPS:

- Barium in DW-01-Edwards (188 µg/l) and DW-02-Edwards (104 µg/l)

Metals detected at concentrations above the applicable 2L Standards or GWPSs:

- None

Appendix I VOCs (US EPA Methods 8260)

No VOCs were detected in the residential well samples at estimated (J-flagged) concentrations below their SWSLs.

VOCs detected at concentrations above the associated SWSL but below the applicable 2L Standard or GWPS:

- None

VOCs detected at concentrations above the associated 2L Standard or GWPS:

- None

4.0 SUMMARY

A summary of the semiannual groundwater monitoring event conducted on October 15 and 17, 2008 at the Closed Landfill is provided below.

Groundwater

Only one metal, barium, was detected at concentrations above its SWSL (100 ug/l) in groundwater monitoring well samples. The metal was detected in the samples from 5802-MW01-OLD at 220 µg/l and in 5802-BG-SPRING-OLD at 152 µg/l. Barium was also detected at a concentration above the SWSL in the two domestic water well samples: 5802-DW-01 at 188 µg/l and 5802-DW-02 at 104 µg/l. However, no metals were detected in either the monitoring well samples or the domestic water well samples at concentrations that exceeded the associated 2L Standard or GWPS.

No VOCs were detected at concentrations above their respective SWSLs in either the monitoring well samples or the domestic water well samples. Similarly, no VOCs were detected at concentrations above the associated 2L Standard or GWPS.

Surface Water

No metals or VOCs were detected at concentrations above their respective SWSLs in the surface-water samples. Similarly, no metals or VOCs were detected at concentrations above their 2B Standards. This is in contrast to the results from the spring 2008 semiannual sampling event at the Closed Landfill. During that event, one metal, mercury, was detected in both surface water sampling locations at a concentration (0.012 µg/l in both samples) above the metal's 2B Standard (0.12 µg/l).

Altamont will continue to monitor metals and VOCs on a semiannual basis at the Madison County Closed Solid Waste Landfill. The next sampling event is scheduled for April 2009.