BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

June 10, 2011

North Carolina Department of Environment and Natural Resources
Division of Waste Management – Solid Waste Section
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Ms. Elizabeth S. Werner
Hydrogeologist

**Subject: Proposed Groundwater Sampling Matrix for August 2011**
**Closed Francis Farm Landfill**
Haywood County, North Carolina
BLE Project Number J10-1957-14
Permit Number 44-03

Dear Ms. Werner:

Bunnell-Lammons Engineering, Inc. (BLE) is pleased to provide this proposed groundwater sampling matrix to the DWM on behalf of Haywood County, North Carolina. This matrix is proposed as a one-time sampling event for August 2011 only. We anticipate that the future groundwater sampling matrix will be dynamic as groundwater assessment continues at the site. This proposed matrix has been prepared in compliance with the requirements of NCAC Title 15A 13B .1634 (b).

As you will recall, Haywood County is conducting an ongoing groundwater assessment at the subject site in compliance with the Assessment Monitoring Program rules. As part of the assessment, ten (10) new groundwater monitoring wells (MW-6 through MW-15) were installed at the site to supplement the previously existing six (6) groundwater monitoring wells (MW-1, MW-1A, MW-2A, MW-3A, MW-4, and MW-5). These wells (except MW-1; which is typically dry) were sampled in February 2011 during a routine semi-annual groundwater monitoring event. The previously existing wells were sampled for the Appendix I compound list and the new wells were sampled for the Appendix II compound list in accordance with the DWM approved assessment plan. A summary of those results were provided to the DWM in a document titled *Groundwater Assessment Data Submittal -- February 2011* dated May 12, 2011 (BLE Project Number J10-1957-14). A final report of the findings is scheduled to be submitted to the DWM on or about August 19, 2011.

In summary, the results indicate that additional assessment will be required to characterize the nature and extent of the release. Based on these data, Haywood County, McGill Associates, and BLE have begun planning to meet the requirements of NCAC Title 15A 13B .1634 (g)(1) & (2).

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**Summary of February 2011 Results & Proposed Matrix**

A summary of the February 2011 sampling data is shown on Tables 1 through 4. The proposed sampling matrix for August 2011 is included as Table 5. Our rationale for the proposed sampling matrix is discussed below.

***Volatile Organic Compounds (VOCs)*** – The primary contaminants of concern at the site are VOCs. We propose to continue to sample all wells for VOCs.

***Semi-Volatile Organics (SVOC)*** – Concentrations of 1,2-dichlorobenzene were detected in MW-11, MW-14, and MW-15 and concentrations of 1,2-dichlorobenzene were detected in MW-13 and MW-14. No other SVOC compounds were detected. Since both of the detected compounds are also detected in the VOC analysis (EPA Method 8260), we propose to discontinue SVOC sampling in all wells.

***Total Metals*** – Concentrations of total barium (in MW-9 and MW-13), total chromium (in MW-9 and MW-10), and total lead (in MW-9) were detected above NC2L groundwater standards. It is our opinion that these concentrations (and those of other total metals) are typically naturally occurring and the result of sample turbidity and not an indicator of a release of metals from the landfill. We propose to continue to sample for total metals and to add dissolved metals analysis to the matrix for this event to confirm our assumptions.

***Pesticides*** – Concentrations of heptachlor were detected in MW-11 and concentrations of lindane were detected in MW-14. We propose to sample all wells for pesticides in August 2011 to confirm the February 2011 results and to determine if concentrations of pesticides are present in the old wells on the landfill property. Please note that groundwater monitoring well MW-11 is installed close to the foundation of the Haywood County Maintenance Garage and the detected concentration of heptachlor may be the result of treatment of the foundation or of the structure itself.

***Herbicides*** – A concentration of silvex was detected in MW-7. No other herbicides were detected. We propose to sample all wells for herbicides in August 2011 to confirm the February 2011 results and to determine if concentrations of herbicides are present in the old wells on the landfill property. Please note that the affected well was installed on agricultural lands and also that lands formerly used as orchard are present nearby. It is possible that the detected herbicide is the result of agricultural land use and not the result of a release from the landfill.

***PCBs and Sulfide*** – Concentrations of PCBs and sulfide were not detected in February 2011. We proposed to discontinue PCB and sulfide sampling in all wells.

***Cyanide*** – Concentrations of cyanide were detected in MW-14 and MW-15. We propose to sample all wells for cyanide in August 2011 to confirm the February 2011 results.

***Water Supply Wells within 1,500 feet of the Landfill*** – Although it does not appear that VOCs have migrated a substantial distance from the site, Haywood County has begun a water supply well survey within 1,500 feet of the landfill. These activities have been performed by the county as a pro-active measure and in compliance with the requirements of NCAC Title 15A 13B .1634 (g) and

NCAC Title 15A 13B .1635 (c). Haywood County, with the concurrence of BLE and McGill, plans to conduct sampling of water supply wells within the specified search radius as part of the August 2011 sampling event. The water supply wells will be sampled for VOCs by EPA Method 8260. The water supply well survey is currently in progress. Results to date have identified 56 properties within the search radius. Approximately 22 of these properties are believed to be serviced by private groundwater supply wells. Haywood County will complete the water supply well survey prior to the August 2011 sampling event.

We appreciate the opportunity to work with Haywood County, McGill, and the DWM on this project. We request that the DWM review and approve the proposed matrix. If the DWM has any questions or comments, please contact us at (864) 288-1265.

Sincerely,
**BUNNELL-LAMMONS ENGINEERING, INC.**

Andrew W. Alexander, P.G., RSM
Senior Hydrogeologist
Registered, NC No. 1475

Trevor J. Benton, P.G.
Project Hydrogeologist
Registered, NC No. 2025

cc: Mr. Stephen King – Haywood County
Mr. David Francis – Haywood County
Mr. Jeff Bishop, P.E. – McGill Associates
Ms. Andrea Keller – NCDENR Asheville

Attachments: Tables 1 through 5

*c:\awa\active projects\mcgill\haywood county lf\1957-14 francis farm well installation\1957-14 proposed sampling matrix august 2011\fflf proposed aug 2011 groundwater matrix 1957-14.doc*

**Table 1**
**Groundwater Monitoring Well Construction and Groundwater Elevation Data**
**Closed Francis Farm Landfill**
**Haywood County, North Carolina**
**Permit Number 44-03**
**BLE Project No. J10-1957-14**

| February 21, 2011 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Well** | **Well Location** | **Northing (feet)** | **Easting (feet)** | **Meas. Pt. Elevation** | **Gnd. Surface Elevation** | ***Depth to Water (bgs)** | **Depth to Water (bmp)** | **Water Elevation** | **Total Borehole Depth (bgs)** | **Screen Depth (bgs)** | **Screen Elevation** | **Well Type** | **Well Monitors** | **Top of Rock Depth (bgs)** | **Top of Rock Elev.** |
| MW-1 | On-Site | 662,529.13 | 822,317.14 | 2,666.59 | 2,663.72 | >33.13 | >36 | <2630.59 | UK | UK - UK | UK - UK | UK | UK | UK | UK |
| MW-1A | On-Site | 662,590.73 | 822,083.15 | 2,690.88 | 2,687.97 | 45.41 | 48.32 | 2,642.56 | UK | UK - UK | UK - UK | UK | UK | UK | UK |
| MW-2A | On-Site | 662,347.08 | 822,814.69 | 2,643.78 | 2,640.98 | 23.16 | 25.96 | 2,617.82 | 27.0 | 12.0 - 27.0 | 2,629.0 - 2,614.0 | II | PWR/BR | 18.0 | 2,623.0 |
| MW-3A | On-Site | 661,921.62 | 823,026.22 | 2,674.29 | 2,671.59 | 38.40 | 41.10 | 2,633.19 | UK | UK - UK | UK - UK | UK | UK | UK | UK |
| MW-4 | On-Site | 661,420.29 | 822,245.39 | 2,789.47 | 2,786.88 | 68.80 | 71.39 | 2,718.08 | UK | UK - UK | UK - UK | UK | UK | UK | UK |
| MW-5 | On-Site | 661,286.31 | 822,167.91 | 2,797.08 | 2,797.37 | 75.33 | 75.04 | 2,722.04 | 94.0 | 73.1 - 88.1 | 2,724.3 - 2,709.3 | II | PWR | 89.0 | 2,708.4 |
| Groundwater Monitoring Wells MW-6 through MW-15 Installed by BLE | | | | | | | | | | | | | | | |
| MW-6 | Off-Site | 662,941.12 | 822,167.78 | 2,612.63 | 2,613.03 | 6.82 | 6.42 | 2,606.21 | 12.5 | 2.3 - 12.3 | 2,610.7 - 2,600.7 | II | Res/Collv | 12.5 | 2,600.5 |
| MW-7 | Off-Site | 662,800.72 | 822,584.39 | 2,621.33 | 2,621.48 | 8.52 | 8.37 | 2,612.96 | 24.0 | 4.0 - 19.0 | 2,617.5 - 2,602.5 | II | Collv/Allv | NE | NE |
| MW-8 | Off-Site | 662,619.60 | 822,989.68 | 2,620.05 | 2,620.25 | 5.93 | 5.73 | 2,614.32 | 19.0 | 3.0 - 13.0 | 2,617.3 - 2,607.3 | II | Alluvial | NE | NE |
| MW-9 | Off-Site | 662,309.84 | 823,295.25 | 2,618.67 | 2,619.19 | 2.86 | 2.34 | 2,616.33 | 19.0 | 2.0 - 12.0 | 2,617.2 - 2,607.2 | II | Alluvial | NE | NE |
| MW-10 | Off-Site | 661,947.33 | 823,365.59 | 2,623.60 | 2,623.96 | 2.88 | 2.52 | 2,621.08 | 15.0 | 2.0 - 12.0 | 2,622.0 - 2,612.0 | II | Alluvial | NE | NE |
| MW-11 | On-Site | 661,509.39 | 822,572.73 | 2,756.22 | 2,756.46 | 79.60 | 79.36 | 2,676.86 | 100.0 | 70.8 - 85.8 | 2,685.7 - 2,670.7 | II | BR | 71.0 | 2,685.5 |
| MW-12 | Off-Site | 661,078.94 | 822,142.39 | 2,803.11 | 2,800.28 | 70.63 | 73.46 | 2,729.65 | 90.0 | 64.8 - 79.8 | 2,735.5 - 2,720.5 | II | BR | 64.0 | 2,736.3 |
| MW-13 | On-Site | 661,377.43 | 821,791.88 | 2,799.14 | 2,799.51 | 84.53 | 84.16 | 2,714.98 | 127.0 | 74.0 - 89.0 | 2,725.5 - 2,710.5 | II | PWR/BR | 81.0 | 2,718.5 |
| MW-14 | On-Site | 661,894.81 | 821,755.37 | 2,770.34 | 2,770.64 | 85.98 | 85.68 | 2,684.66 | 120.0 | 93.8 - 108.8 | 2,676.8 - 2,661.8 | II | BR | 33.0 | 2,737.6 |
| MW-15 | On-Site | 662,338.59 | 821,896.86 | 2,719.57 | 2,716.89 | 80.96 | 83.64 | 2,635.93 | 163.0 | 75.8 - 90.8 | 2,641.1 - 2,626.1 | II | BR | 19.0 | 2,697.9 |

Notes:
All survey data provided by McGill Associates, all units in feet.
*DTW from bgs values have been calculated from survey data provided by McGill Associates.
All values shown to the nearest 0.1-ft have been rounded.
Water levels measured on 2/21/11 by Pace
MW-1, -1A, -2A, -3A, -4, -5 installed by others. MW-6 through MW-15 installed by BLE.

Measuring Point Elevation is top of casing
II = Type II well
NE = Not encountered
UK = Unknown, information is not available

BR & PWR = Bedrock & Partially Weathered Rock
Res = Residuum
Collv = Colluvium
Allv = Alluvium



Prepared by: AWA
Checked by: RAD

**Table 2**
**Volatile Organic Compounds (VOC) Data**
**Closed Francis Farm Landfill**
**Haywood County, North Carolina**
**Permit Number 44-03**
**BLE Project No. J10-1957-14**

| Sampled by Pace on February 22, 2011 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COMPOUND** | **UNITS** | **MDL** | **RL** | **MCL** | **MW-1A** | **MW-2A** | **MW-3A** | **MW-4** | **MW-5** | **MW-6** | **MW-7** | **MW-8** | **MW-9** | **MW-10** | **MW-11** | **MW-12** | **MW-13** | **MW-14** | **MW-15** |
| Acetone | µg/l | 2.2 | 25 | 6000 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | **2.3** | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 |
| Acrylonitrile | µg/l | 1.9 | 10 | NE | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 | <1.9 |
| Benzene | µg/l | 0.25 | 1 | 1 | <0.25 | <0.25 | <0.25 | **15.5** | **5.1** | <0.25 | **0.72** | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | **5.3** | **1.3** | **0.42** |
| Bromochloromethane | µg/l | 0.17 | 1 | NE | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 |
| Bromodichloromethane | µg/l | 0.18 | 1 | 0.6 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 |
| Bromoform | µg/l | 0.26 | 1 | 4 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 |
| Carbon Disulfide | µg/l | 1.2 | 2 | 700 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | **1.2** |
| Bromomethane (Methylbromide) | µg/l | 0.29 | 2 | NE | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 |
| Carbon tetrachloride | µg/l | 0.25 | 1 | 0.3 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 |
| Chlorobenzene (mono) | µg/l | 0.23 | 1 | 50 | **1.8** | <0.23 | <0.23 | <0.23 | <0.23 | <0.23 | **0.93** | <0.23 | <0.23 | <0.23 | <0.23 | <0.23 | **0.61** | **1.6** | <0.23 |
| Chloroethane | µg/l | 0.54 | 1 | 3000 | **1.5** | <0.54 | **7.3** | **3.1** | **4** | <0.54 | **1.3** | <0.54 | <0.54 | <0.54 | <0.54 | <0.54 | **1.3** | **1.3** | <0.54 |
| Chloroform | µg/l | 0.14 | 1 | 70 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 |
| Chloromethane (Methylchloride) | µg/l | 0.11 | 1 | 3 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | <0.11 | **0.26** |
| Dibromochloromethane | µg/l | 0.21 | 1 | 0.4 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 |
| 1,2-Dibromo-3-chloropropane; DBCP | µg/l | 2.5 | 5 | 0.04 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 |
| 1,2-Dibromoethane; Ethylene dibromide | µg/l | 0.27 | 1 | 0.02 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 |
| Dibromomethane | µg/l | 0.21 | 1 | NE | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 |
| 1,2-Dichlorobenzene | µg/l | 0.3 | 1 | 20 | <0.3 | <0.3 | **1.1** | <0.3 | <0.3 | <0.3 | **1.4** | <0.3 | <0.3 | **0.33** | **4.2** | <0.3 | <0.3 | **104** | **3.3** |
| 1,4-Dichlorobenzene | µg/l | 0.33 | 1 | 6 | <0.33 | **7** | **1.2** | **4.7** | **1.3** | <0.33 | **1.7** | <0.33 | <0.33 | <0.33 | **1.4** | <0.33 | **5.9** | **21.4** | **0.8** |
| trans-1,4-Dichloro-2-butene | µg/l | 1 | 1 | NE | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-Dichloroethane | µg/l | 0.32 | 1 | 6 | **1.2** | **1.4** | **17.5** | **31.9** | **12.9** | <0.32 | **4.4** | <0.32 | **0.34** | **3.1** | **7.5** | <0.32 | **4.8** | **1.5** | **1** |
| 1,2-Dichloroethane | µg/l | 0.12 | 1 | 0.4 | <0.12 | <0.12 | **2.8** | **2** | <0.12 | <0.12 | **3** | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 |
| 1,1-Dichloroethene (-ethylene) | µg/l | 0.56 | 1 | 7 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 | <0.56 |
| cis-1,2-Dichloroethene (-ethylene) | µg/l | 0.19 | 1 | 70 | **1** | **5.6** | **1.6** | **34.6** | **14.4** | <0.19 | **2.7** | <0.19 | **0.55** | **2.3** | **10.9** | <0.19 | **17.3** | **32.5** | **8.9** |
| trans-1,2-Dichloroethene (-ylene) | µg/l | 0.49 | 1 | 100 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 | <0.49 |
| 1,2-Dichloropropane | µg/l | 0.27 | 1 | 0.6 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | <0.27 | **0.58** | <0.27 | <0.27 | <0.27 | **0.46** | <0.27 | <0.27 | <0.27 | <0.27 |
| cis-1,3-Dichloropropene (-propylene) | µg/l | 0.13 | 1 | 0.4 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 | <0.13 |
| trans-1,3-Dichloropropene (-propylene) | µg/l | 0.26 | 1 | 0.4 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 |
| Diisopropyl ether | µg/l | 0.12 | 1 | NE | NT | NT | NT | NT | NT | <0.12 | **0.31** | <0.12 | <0.12 | <0.12 | **0.31** | <0.12 | **0.67** | **0.34** | **0.24** |
| Ethylbenzene | µg/l | 0.3 | 1 | 600 | <0.3 | <0.3 | <0.3 | **1.7** | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| 2-Hexanone | µg/l | 0.46 | 5 | NE | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 |
| Iodomethane | µg/l | 0.32 | 5 | NE | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 |
| Dichloromethane (Methylene chloride) | µg/l | 0.97 | 1 | 5 | <0.97 | <0.97 | <0.97 | **46.6** | <0.97 | <0.97 | <0.97 | <0.97 | <0.97 | <0.97 | <0.97 | <0.97 | <0.97 | <0.97 | <0.97 |
| 2-Butanone (Methyl ethyl ketone) | µg/l | 0.96 | 5 | 4000 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 | <0.96 |
| 4-Methyl-2-Pentanone | µg/l | 0.33 | 5 | NE | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| Styrene | µg/l | 0.26 | 1 | 70 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 |
| 1,1,1,2-Tetrachloroethane | µg/l | 0.33 | 1 | NE | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.4 | 1 | 0.2 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| Tetrachloroethene (-ethylene) | µg/l | 0.46 | 1 | 0.7 | <0.46 | <0.46 | <0.46 | **6.7** | **5.6** | <0.46 | <0.46 | <0.46 | <0.46 | **0.85** | **0.53** | <0.46 | **2.2** | <0.46 | <0.46 |
| Toluene | µg/l | 0.26 | 1 | 600 | <0.26 | <0.26 | <0.26 | **11.4** | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 | <0.26 |
| 1,1,1-Trichloroethane | µg/l | 0.48 | 1 | 200 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 | <0.48 |
| 1,1,2-Trichloroethane | µg/l | 0.29 | 1 | 200000 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 | <0.29 |
| Trichloroethene (-ethylene) | µg/l | 0.47 | 1 | 3 | <0.47 | <0.47 | <0.47 | **7** | **4.8** | <0.47 | <0.47 | <0.47 | <0.47 | **0.55** | **0.53** | <0.47 | **1.7** | <0.47 | <0.47 |
| Trichlorofluoromethane | µg/l | 0.2 | 1 | 2000 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| 1,2,3-Trichloropropane | µg/l | 0.41 | 1 | 0.005 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 | <0.41 |
| Vinyl acetate | µg/l | 0.35 | 2 | NE | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 |
| Vinyl chloride | µg/l | 0.62 | 1 | 0.03 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | <0.62 | **0.79** | <0.62 | <0.62 |
| M&P Xylene | µg/l | 0.66 | 2 | 500 | <0.66 | <0.66 | <0.66 | **8.4** | <0.66 | <0.66 | <0.66 | <0.66 | <0.66 | <0.66 | <0.66 | <0.66 | <0.66 | <0.66 | <0.66 |
| O Xylene | µg/l | 0.23 | 1 | 500 | <0.23 | <0.23 | <0.23 | **4.2** | **2.3** | <0.23 | <0.23 | <0.23 | <0.23 | <0.23 | <0.23 | <0.23 | **8.8** | <0.23 | <0.23 |
| Dichlorodifluormethane | µg/l | 0.21 | 1 | 1000 | NT | NT | NT | NT | NT | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 | <0.21 |
| | | | | | | | | | | | | | | | | | | | |
| Total VOCs | µg/l | NE | NE | NE | **5.5** | **14.0** | **31.5** | **177.8** | **50.4** | **ND** | **19.3** | **ND** | **0.9** | **7.1** | **25.8** | **ND** | **49.4** | **163.9** | **16.1** |

Notes:
MDL = Laboratory Method Detection Limit
RL = Laboratory Report Limit
MCL = Maximum Contaminant Level, as established in the NCDENR, Classifications of Water Quality Standards Applicable to Groundwaters of North Carolina, Section 15A NCAC 2L.202.
Refer to the laboratory data sheets for detected concentrations which are J values (estimated values above MDL but below RL).

NT = Not Tested
NE = Not Established; North Carolina has not established a MCL
Shaded cells indicated exceedances of MCLs.
Samples collected by Pace on February 22, 2011
Analysis by EPA Method 8260



Prepared by: AWA
Checked by: MLT

**Table 3**
**Semi Volatile Organic Compounds (SVOC), Pesticides, Herbicides, PCBs, Sulfide, & Cyanide**
**Closed Francis Farm Landfill**
**Haywood County, North Carolina**
**Permit Number 44-03**
**BLE Project No. J10-1957-14**

| | | | | | | Sampled by Pace on February 22, 2011 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLASS -- COMPOUND** | **Method** | **UNITS** | **MDL** | **RL** | **MCL** | **MW-1A** | **MW-2A** | **MW-3A** | **MW-4** | **MW-5** | **MW-6** | **MW-7** | **MW-8** | **MW-9** | **MW-10** | **MW-11** | **MW-12** | **MW-13** | **MW-14** | **MW-15** |
| Pesticides -- Heptachlor | EPA 8081 | µg/l | 0.0015 | 0.01 | 0.008 | NT | NT | NT | NT | NT | <0.0015 | <0.0015 | <0.0015 | <0.0015 | <0.0015 | **0.079** | <0.0015 | <0.0015 | <0.0015 | <0.0015 |
| Pesticides -- Lindane | EPA 8081 | µg/l | 0.0002 | 0.01 | 0.03 | NT | NT | NT | NT | NT | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | **0.027** | <0.0002 |
| Pesticides -- All Other | EPA 8081 | µg/l | NA | NA | NA | NT | NT | NT | NT | NT | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| PCBs | EPA 8082 | µg/l | 0.59 | 0.59 | NA | NT | NT | NT | NT | NT | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Herbicides -- Silvex | EPA 8151 | µg/l | 0.049 | 2 | 50 | NT | NT | NT | NT | NT | <0.049 | **0.078** | <0.049 | <0.049 | <0.049 | <0.049 | <0.049 | <0.049 | <0.049 | <0.049 |
| Herbicides -- All Other | EPA 8151 | µg/l | NA | NA | NA | NT | NT | NT | NT | NT | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SVOCs -- 1,2-Dichlorobenzene | EPA 8270 | µg/l | 0.88 | 10 | 20 | NT | NT | NT | NT | NT | <0.88 | <0.88 | <0.88 | <0.88 | <0.88 | **1.8** | <0.88 | <0.88 | **42.2** | **1.2** |
| SVOCs -- 1,4-Dichlorobenzene | EPA 8270 | µg/l | 0.95 | 10 | 6 | NT | NT | NT | NT | NT | <0.95 | <0.95 | <0.95 | <0.95 | <0.95 | <0.95 | <0.95 | **2.4** | **9.6** | <0.95 |
| SVOCs -- All Other | EPA 8270 | µg/l | NA | NA | NA | NT | NT | NT | NT | NT | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Sulfide | SM 4500-S2D | mg/l | 0.1 | 0.1 | NE | NT | NT | NT | NT | NT | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Cyanide | SM 4500-CN-E | mg/l | 0.005 | 0.005 | 0.07 | NT | NT | NT | NT | NT | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | **0.0067** | **0.0086** |

Notes:
MDL = Laboratory Method Detection Limit
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NA = Not Applicable
NT = Not Tested
NE = Not Established; North Carolina has not established a MCL
ND = Not Detected
Shaded cells indicated exceedances of MCLs.
Refer to the laboratory data sheets for detected concentrations which are J values (estimated values above MDL but below RL).
Samples collected by Pace on February 22, 2011



Prepared by: AWA
Checked by: MLT

**Table 4**
**Total Metals Data**
**Closed Francis Farm Landfill**
**Haywood County, North Carolina**
**Permit Number 44-03**
**BLE Project No. J10-1957-14**

| Sampled by Pace on February 22, 2011 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TEST** | **UNITS** | **MDL** | **RL** | **MCL** | **MW-1A** | **MW-2A** | **MW-3A** | **MW-4** | **MW-5** | **MW-6** | **MW-7** | **MW-8** | **MW-9** | **MW-10** | **MW-11** | **MW-12** | **MW-13** | **MW-14** | **MW-15** |
| Total Antimony (Sb) | µg/l | 2.6 | 5 | NE | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | **5.1** | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Total Arsenic (As) | µg/l | 2.7 | 5 | 10 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | **5.8** | <5.0 | **5.3** | <5.0 | <5.0 | <5.0 | **3.9** |
| Total Barium (Ba) | µg/l | 0.2 | 5 | 700 | **171** | **191** | **241** | **163** | **237** | **54** | **213** | **72.8** | **1190** | **193** | **138** | **197** | **977** | **309** | **68.7** |
| Total Beryllium (Be) | µg/l | 0.1 | 1 | NE | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | **0.19** | <1.0 | **3.6** | **0.51** | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Total Cadmium (Cd) | µg/l | 0.5 | 1 | 2 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Total Chromium (Cr) | µg/l | 0.4 | 5 | 10 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | **2.5** | **3.7** | **6.3** | **161** | **17.6** | **1.7** | **8.1** | **1.8** | **3.7** | **2.4** |
| Total Cobalt (Co) | µg/l | 0.6 | 5 | NE | **10.5** | **55.5** | **110** | **13.5** | **16.8** | **1.3** | **5.4** | <5.0 | **40.5** | **5.2** | **9.4** | **9.8** | **3.2** | **6.1** | **2.6** |
| Total Copper (Cu) | µg/l | 0.3 | 5 | 1,000 | <5.0 | <5.0 | **5.1** | <5.0 | **155** | **1.1** | **2.4** | **2.3** | **64.3** | **10.7** | <5.0 | **3.2** | <5.0 | <5.0 | <5.0 |
| Total Lead (Pb) | µg/l | 4 | 5 | 15 | <5.0 | <5.0 | <5.0 | <5.0 | **7.2** | <5.0 | <5.0 | <5.0 | **16.2** | **6.3** | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Total Mercury (Hg) | µg/l | 0.1 | 0.2 | 1 | NT | NT | NT | NT | NT | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| Total Nickel (Ni) | µg/l | 1.7 | 5 | 100 | <5.0 | <5.0 | **39** | **5** | **5.4** | **8** | <5.0 | **4.2** | **97.3** | **8.4** | <5.0 | **7.6** | **15.9** | **7.5** | <5.0 |
| Total Selenium (Se) | µg/l | 3.8 | 10 | 20 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 |
| Total Silver (Ag) | µg/l | 0.1 | 5 | 20 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | **0.11** | <5.0 | <5.0 | <5.0 | **0.34** | <5.0 | **0.37** | **0.12** | **0.45** |
| Total Thallium (Tl) | µg/l | 3 | 5.4 | NE | <5.4 | <5.4 | <5.4 | <5.4 | <5.4 | <5.4 | **4.3** | <5.4 | <5.4 | <5.4 | <5.4 | <5.4 | <5.4 | <5.4 | <5.4 |
| Total Vanadium (V) | µg/l | 0.2 | 5 | NE | <5.0 | <5.0 | <5.0 | **6.1** | <5.0 | **2.6** | **4.3** | **5.6** | **205** | **22.8** | <5.0 | **7.8** | <5.0 | **0.38** | **0.73** |
| Total Zinc (Zn) | µg/l | 0.4 | 10 | 1,000 | <10.0 | <10.0 | <10.0 | **30.7** | **90.4** | **5.1** | **19.8** | **7.7** | **162** | **36.7** | **10.3** | **26.5** | **0.71** | **16** | **5.6** |

Notes:
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NT = Not Tested
NE = Not Established; North Carolina has not established a MCL
Shaded cells indicated exceedances of MCLs.
Refer to the laboratory data sheets for detected concentrations which are J values (estimated values above MDL but below RL).
Samples collected by Pace on February 22, 2011
Analysis by EPA Methods 6010 & 7470



Prepared by: AWA
Checked by: MLT

**Table 5**
**Proposed Groundwater Sampling Matrix -- August 2011**
**Closed Francis Farm Landfill**
**Haywood County, North Carolina**
**Permit Number 44-03**
**BLE Project No. J10-1957-14**

| Well | VOCs EPA 8260 | SVOCs EPA 8270 | Total Metals EPA 6010/7470 | Dissolved Metals EPA 6010/7470 | Pesticides EPA 8081 | Herbicides EPA 8151 | PCBs EPA 8082 | Sulfide SM 4500-S2D | Cyanide SM 4500-CN-E |
|---|---|---|---|---|---|---|---|---|---|
| MW-1 | No | No | No | No | No | No | No | No | No |
| MW-1A | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-2A | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-3A | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-4 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-5 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-6 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-7 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-8 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-9 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-10 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-11 | Yes | No (3) | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-12 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-13 | Yes | No (3) | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-14 | Yes | No (3) | Yes | Yes | Yes | Yes | No | No | Yes |
| MW-15 | Yes | No (3) | Yes | Yes | Yes | Yes | No | No | Yes |

Notes:
(1) MW-1 is typically dry and cannot be sampled
(2) Analyses listed as "**No**" were not detected in during the February 2011 sampling event
(3) The SVOCs detected in MW-11, -13, -14, and -15 were also detected by the VOC analyses; therefore SVOC analyses are not required
(4) VOCs = Volatile Organic Compounds
(5) SVOCs = Semi-Volatile Organic Compounds
(6) EPA or SM #### = Environmental Protection Agency or Standard Method analysis method code
(7) Dissolved Metals will be filtered in the laboratory



Prepared by: AWA
Checked by: MSP