CIVIL/SANITARY/ENVIRONMENTAL ENGINEERS
SOLID WASTE MANAGEMENT
Municipal Services
Engineering Company, P.A.
SITE PLANNING/SUBDIVISIONS
SUBSURFACE UTILITY ENGINEERING (SUE)

February 13, 2009

Mr. Zinith Barbee, Hydrogeologist Permitting Branch
Solid Waste Section
Division of Waste Management
North Carolina Department of Environmental and Natural Resources
401 Oberlin Road, Suite 150
Raleigh, NC 27605

Re: Corrective Action Plan
Lenoir County C&D Permit #54-03

Dear Mr. Barbee:

Enclosed you will find the Corrective Action Plan for the Lenoir County C&D Landfill, permit #54-03. An electronic copy is also provided. Please contact us by phone at (919) 772-5393, should you have any questions or comments regarding this report.

Sincerely,
MUNICIPAL ENGINEERING SERVICES CO., P.A.

Sean K. Patrick, P.G.
Professional Geologist

Attachments

PO Box 97, Garner, North Carolina 27529 (919) 772-5393
PO Box 828, Morehead City, NC 28557 (252) 726-9481
PO Box 349, Boone, NC 28607 (828) 262-1767

Corrective Action Plan

Prepared for

Lenoir County Landfill - Permit #54-03
La Grange, Lenoir County, North Carolina

MESCO Project Number: G07062.0

Completed on 2/13/2009

Municipal Services Garner, NC
Engineering Company, P.A. Boone, NC

Municipal Engineering Services Company, P.A.
Garner, Boone and Morehead City, North Carolina

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1 INTRODUCTION

1.1 Site Background

The Lenoir County Sanitary landfill is located on Hodges Farm Road (SR 1524), La Grange, Lenoir County, North Carolina. Lenoir County landfill operates under permit #54-03. Prior to operation as a C&D landfill the site operated as a Municipal Solid Waste (MSW) unlined sanitary landfill. A small area of the MSW, located in the southern portion of the facility stopped receiving waste prior to October 1994 and was closed with a 24 inch soil cover. The remainder of the sanitary landfill was closed prior to October 1998. This unit was closed with a cohesive cap of 18 inches of soil with a permeability of 1 x 10^{-5} cm/sec, and 18 inches of erosive layer, as part of the *Transition Plan*.[9] The C&D landfill was constructed and is operating on top of the MSW unit. In 1980 S&ME completed a geotechnical investigation of the soils per the City of Kinston's request. Adjacent to the C&D landfill and utilizing the same scale house is the existing Subtitle D MSW landfill, which also operates under permit #54-09. The site is monitored under 15A NCAC 13B.1630. A topographic map showing the location of the site is included as **Plate 1**. A site map showing the layout of the permitted facility is included as **Plate 2**.

1.2 Aquifer Characteristics

The site lies within the Coastal Plain physiographic province that is characterized by flat or gently undulating topography dissected by drainage features with narrow to moderately sloped sides. Surface drainage flows northwest towards Fredricks Branch*, which flows northeast into Falling Creek and subsequently into the Neuse River. The site is generally bounded by NCSR 1524 on the west, Falling Creek on the east and Fredricks Branch on the north. The existing Subtitle D MSW landfill is adjacent to C&D area.

The lithology below the site consists of a unit of unnamed surficial sediments overlying the Cretaceous-age Peedee Formation. The surficial deposits consist of clayey sand, sandy clay, silty sand, and sand. The Peedee Formation consists of an overlying confining unit of clay, silty clay, and sandy clay approximately 25 feet thick; underlain by a unit of fine to medium sand interbedded with clay and silt. The estimated depth of the Peedee confining layer at the site is 36 feet below ground surface (bgs), based upon boring logs from previous subsurface investigations. Monitoring well MW-11 was completed on top of the Peedee confining layer at an approximate elevation of 39.4 feet above mean sea level (amsl). Assuming a slight dip of the confining layer, monitoring wells MW-9 and MW-12 were also completed close to the confining layer.

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* The name of the creek was referenced as Fredricks Branch in the *Transition Plan*. The creek is not named on USGS topographic quadrangle maps.

Regionally, Lenoir County is located in the Coastal Plain groundwater region of the United States.[4] The unconfined aquifer at the site consists of unconsolidated silty and clayey sands that are underlain by the Peedee Confining Unit. Groundwater typically occurs at depths of <10 to over 20 feet below ground surface (bgs), with the shallowest depths occurring in draws and near drainage features. Groundwater depths in the monitoring wells have been generally consistent over time, and occur in the following approximate depth ranges:

- ≤ 10 ft. bgs: *MW-3, MW-4, MW-6, MW-9*
- 10 to 20 ft. bgs: *MW-1, MW-6, MW-8, MW-10, MW-11, MW-12*
- > 20 ft. bgs: *MW-8, MW-10*

Historical groundwater elevations are provided in **Table 2**. Groundwater exhibits flow dynamics that are primarily controlled by the topographical high and local drainage features of Fredricks Branch and Falling Creek. Groundwater flow at the site is in a general east-northeasterly direction. A single-day potentiometric map depicting groundwater flow conditions on July 15, 2008 is provided as **Plate 4**.

Hydraulic conductivities, hydraulic gradients, and average linear groundwater velocities are summarized in **Table 3**. Hydraulic conductivity values, as determined from slug testing, ranged from 6.55 x 10^{-6} cm/sec (MW-12) to 5.40 x 10^{-4} cm/sec (MW-4), with a geometric mean of 1.32 x 10^{-4} cm/sec. Hydraulic gradient in the area of the closed landfill is relatively and shallow and consistent, with a typical value of 0.009 ft/ft.[10] Average linear velocities (v_x) were calculated using the following equation:

$$v_x = \frac{K * i}{n_e}$$

where

v_x is the average linear velocity [length/time]

K is the hydraulic conductivity [length/time]

n_e is the effective porosity [unitless]

i is the horizontal hydraulic gradient in the direction of groundwater flow, taken as the difference in head elevation between two points divided by the distance between those points [unitless, or length/length]

The calculated average linear velocities were found to have a median value of 13.7 ft/yr.

1.3 Contaminant Distribution

Groundwater contamination at the site consists of dissolved-phase volatile organic compounds (VOCs) and inorganic compounds in concentrations exceeding established 15A NCAC 2L groundwater standards. Groundwater contaminants of concern (as identified in the *ACM*) are 1,1-dichloroethane (a VOC) and mercury (a toxic heavy metal). Historic organic and inorganic results of detected constituents are shown in **Tables 4A & 4B**, respectively. The extent of VOCs at the site is depicted in **Plate 6**. VOC concentrations are greatest in the area near monitoring wells MW-8 and MW-10. Groundwater impact is limited to the unconfined aquifer.

1.4 Site Conceptual Models

Site conceptual and analytical models were developed in the *ACM.* The models consisted of conceptual cross sections and analytical modeling using MODFLOW with MT3D[96]. The conceptual cross sections from the *ACM* are provided as **Plate 5**.

Physical Process

The primary mechanism of physical plume movement is through advection. Advective flow with applied sorption (retardation) typically slows plume migration. The retardation coefficient (R) used to calculate the expected migration rates for the constituents can be calculated from the following equation:

$$R = 1 + \frac{\rho_d}{n} K_d$$

where

- R is the retardation coefficient
- ρ_d is the dry bulk density of the soil (g/cm^3)
- n is the porosity (unitless)
- K_d is the distribution coefficient (mL/g)

The average dry bulk density utilized in the *ACM* Report, calculated from laboratory dry weights collected as part of the *Phase 1 Design Hydrogeological Study*, was taken from published literature at a value of 1.78 g/cm^3. The distribution coefficient (K_d) can be estimated as the constituent-specific soil–water partitioning coefficient (K_{oc}) times the fraction of organic carbon in the soil.[3] Based on boring logs and field observations there is little evidence to suggest any significant soil organic carbon. A conservative value for soil organic carbon was estimated to be 1%. “Soils vary in the amount of soil organic carbon they contain, ranging from less than 1 percent in many sandy soils to greater than 20 percent in soils found in wetlands and bogs.”[8]

Coefficients of Retardation	
Constituent	**R**
1,1-Dichloroethane	3.4
Mercury	303.7

The above table suggests that there is limited retardation. 1,1-Dichloroethane has the potential to travel at or near the seepage velocities as identified in the *ACM.* Mercury is expected to be relatively immobile.

Chemical/Biochemical Process

Chemical degradation processes, primarily that of half-life decay, are typically expressed based on surfacewater measurements. The identified contamination consists of constituents dissolved in groundwater. 1,1-Dichloroethane undergoes volatilization from soil when released near the surface and volatilization when released to surfacewaters. Published half-life reactions in groundwater for 1,1-dichloroethane are 22 weeks (high) and 32 days (low) [7]. Biotransformation of most chlorinated solvents, including halogenated aliphatic hydrocarbons, occurs through reductive dechlorination.[2] The reductive dechlorination process utilizes the chlorinated solvents as the electron acceptor. Through reductive dechlorination, carbon is utilized as the electron donor for microbial growth, with the aromatic hydrocarbons acting as the potential carbon source.

1.5 Regulatory Status

The Lenoir County Landfill operates as a C&D landfill over a MSWLF landfill under permit #54-03. Assessment monitoring is currently performed on a semi-annual basis at the site.

2 CONTAMINANT CHARACTERIZATION

2.1 Contaminants of Concern

The following chemical compounds were identified in the *ACM* as being contaminants of concern (COCs):

- 1,1-dichloroethane – *chlorinated aliphatic hydrocarbon*
- mercury – *toxic metal*

2.2 Contaminant Source Confirmation

The groundwater contaminant source is the former MSW landfill cell. The mechanism for the presence of this contamination is precipitation that has percolated through the landfill waste, allowing VOCs to partition from solid/liquid phases into a dissolved phase, and that has subsequently migrated downwards to mix with groundwater. To limit water percolation, the MSW unit was closed with a cohesive cap of 18 inches of soil with a permeability of 1 x 10^{-5} cm/sec, and 18 inches of erosive layer.

2.3 Source Control Measures

The first unit of the landfill stopped receiving MSW by October 1994 and was closed with a 24 inch final soil cover. The second unit was closed with a cohesive cap of 18 inches of soil with a permeability of 1 x 10^{-5} cm/sec, and 18 inches of erosive layer. Lenoir County owns and controls an extensive buffer around the waste. Northeast of the waste is a borrow site and the transfer station. North of the waste is the flood plain consisting of unused property owned by Lenoir County. East of the property is the borrow site for the Subtitle D landfill. South of the property, across Hodges Road and upgradient, is private property that is being used for storage of construction trailers.

A gas venting system for methane extraction/collection was installed as part of the *Transition Plan*. The permanent probes were installed by October 1994, and are monitored quarterly. It is uncertain if the methane system has had any effect on the local contamination.

Several institutional control measures have been implemented to restrict and control access to the site and possible contact with contamination. Public access to the site is limited during operation hours. A chain link fence controls vehicle access off Hodges Farm Road. Heavy vegetation and the floodplain limit access from other areas. Access to groundwater at the facility is controlled by locked monitoring wells. Lenoir County owns the majority of the property surrounding the facility.

The receptor survey performed as part of the *Transition Plan* identified three (3) potable water supply wells and one (1) non-potable water supply well within 2,000 feet of the facility. An updated receptor survey was performed in 2007. Lenoir County has since purchased two of those properties. Connections to the potable water supply wells located on those properties have been removed, and the properties have been demolished or are in the process of being demolished. Municipal water is available to the surrounding area.

The non-potable water supply well is located at the facility, and is used for equipment washing. The well is constructed of 1-inch dia. PVC encased in 3-inch PVC. The depth of the well was reported to be 155 feet bgs with a screened interval from 75-100 feet bgs. These construction details indicate that the on-site non-potable water supply well is screened below the Peedee confining layer, and is cased off from the surficial aquifer. This fact, combined with the low flow rates achievable from wells of this type, indicate that the on-site water supply well would be unable to significantly affect downward migration of groundwater contaminants. There is, therefore, no need to abandon this well as part of any corrective action at the facility.

2.4 Risk Assessment

Risk assessment was performed as part of the *ACM*, and assumed direct contact with the identified contamination. Risk assessments were performed assuming children would consume 1 liter of water each day with an exposure duration of 8 years. Dermal exposure risks assumed contact through bathing based on one 15 minute bath per day. Inhalation exposure assumed 12 cubic meters of air per day. Risk assessment is based on worst case scenario, where exposure is to the maximum observed concentrations and the current concentrations for the contaminants of concern. Exposure tables from the ACM report are presented as **Tables 7A – 7C**.

2.5 Contaminant Concentrations

2.5.1 Background Concentrations

Groundwater sampling and monitoring has been conducted at the site since 1994. Background water quality data has historically been collected from monitoring well MW-1. Background sampling has detected concentrations of arsenic, beryllium, chromium, cobalt, manganese, lead, and zinc, with only manganese and lead exceeding 2L standards. The presence of metals occurring in the background samples, surface water samples, Subtitle D landfill samples, and NURE sediment samples indicate that these metals are all naturally occurring and do not represent contamination associated with the landfill. Historical results are shown in **Tables 4A, 4B, & 5**. Current groundwater results (July 2008) are shown in **Table 6**.

2.5.2 Exceedances of Groundwater Quality Standards

Groundwater contaminants that have been found to exceed 2L standards are 1,1-dichloroethane, 1,2-dichloropropane, benzene, chloroethene, *cis*-1,2-dichloroethene, ethylene dichloride, methylene chloride, *p*-dichlorobenzene, tetrachloroethene, and trichloroethene. Mercury has been detected in monitoring well MW-3, MW-4, MW-5, MW-8, MW-10 and MW-12 from 1995 until 2007. Since the presence of mercury cannot be attributed to natural sources or laboratory error implies that its presence is the result of landfill disposal activities. Manganese and lead concentrations in some samples were also found to exceed 2L standards. However, these compounds were identified in the *ACM* as occurring naturally and are, therefore, not of concern in this study.

2.5.3 Exceedances of Surfacewater Quality Standards

Laboratory analysis of surfacewater samples have not detected contaminant concentrations in excess of established NCAC 2B water quality standards. Appendix I VOCs and metal concentrations were not detected above method detection limits during the July 2008 semi-annual sampling event.

2.6 Media of Concern

Groundwater is the primary media of concern at the site since it acts as the primary mechanism of transport for environmental contaminants emanating from the landfill. Dissolved-phase contaminants can potentially be transported via groundwater and discharged to surfacewater.

Landfill gas is a secondary media of concern since it can transport VOCs that have partitioned into the vapor phase, allowing them to re-partition into the dissolved phase into groundwater. A passive horizontal gas venting system for methane extraction/collection was installed as part of the *Transition Plan*.

3 SELECTED AND APPROVED REMEDY / TECHNICAL APPROACH

A number of factors influenced selection of remediation alternatives.

- Groundwater contamination exists within the surficial (unconfined) aquifer.
- Groundwater contamination exists within the relevant zone of compliance.
- Groundwater contamination exists at relatively low levels (ppb range).
- Groundwater contamination is below risk exposure levels.
- Mercury, one identified COC, was determined in the *ACM* to be relatively immobile.
- No active potable wells have been identified within 2,000 feet of the waste limit.
- The on-site non-potable water supply well is screened below the Peedee confining layer, and cased off from the surficial aquifer.

Remediation of relatively low level contamination in the 100 ppb range can be difficult, expensive and may not be achievable. The relatively low levels of groundwater contamination indicate that remediation could be performed using monitored natural attenuation.

3.1 Technical Approach – Monitored Natural Attenuation

Groundwater contamination exists within the unconfined, shallow aquifer. Natural attenuation mechanisms are actively controlling groundwater contaminant movement in this area. Results of groundwater contaminant modeling indicate limited plume movement over a 50-year period. Modeling results from the *ACM* report are presented in **Appendix A**.

Groundwater sampling will continue to be performed semi-annually on all monitoring wells currently included in the sampling schedule. Additionally, baseline sampling for the full suite of MNA performance parameters listed in **Section 4** and **Appendix B** shall be performed for two years following initiation of the remedial strategy. Monitoring of stream quality in the adjacent surface waters will be achieved through sampling at sampling point SW-1 and SW-2 (see **Plate 3**, and **Appendix B, Plate B**). Surfacewater sampling parameters will include Appendix I VOCs and metals.

4 GROUNDWATER AND SURFACEWATER MONITORING PLAN

4.1 Groundwater Sampling and Monitoring

Data with which to monitor and evaluate the performance of remediation shall be obtained through a groundwater sampling and monitoring program. Semi-annual groundwater sampling will continue to be performed on the following wells: MW-1, MW-3, MW-4, MW-6, MW-9, MW-11, and MW-12. All groundwater samples collected from the monitoring wells will be analyzed for Appendix I VOC concentrations by EPA method 8260, and for mercury. Additionally, the following MNA performance parameters will be analyzed for an initial two-year period for following initiation of corrective action:

MNA Performance Parameters		
Parameter	**Analysis Type**	**Analytical Method**
Dissolved Oxygen (DO)	Field Reading	Multi-parameter Field Instrument w/ flow-through cell
pH	Field Reading	
Oxidation-Reduction Potential (ORP)	Field Reading	
Turbidity	Field Reading	
Conductivity	Field Reading	
Temperature	Field Reading	
Dissolved CO_2	Field Reading	Field Instrument / Hach Kit
Alkalinity (Total as $CaCO_3$)*	Laboratory/Field*	EPA 310.2
Chloride*	Laboratory/Field*	SM 4500-CLB
Iron	Laboratory	SM3111B
Nitrate*	Laboratory/Field*	EPA 353.2 / SM 2320B
Sulfate*	Laboratory/Field*	EPA 375.4 / SM 4500-SO4E
Sulfide*	Laboratory/Field*	EPA 376.1 or SM 4500SE
TOC/BOD/COD	Laboratory	EPA 415.1 / EPA 405.1 / EPA 410.1
Methane	Laboratory	RSK 175
Ethane, Ethene	Laboratory	RSK 175
Hydrogen	Laboratory	AM19GA
Volatile Fatty Acids	Laboratory	AM23G
*For budgetary considerations these analyses may be performed in the field using Hach® brand color wheel test kits. Historical iron concentrations have exceeded Hach kit quantitation limits.		

4.2 Surfacewater Sampling and Monitoring

Surfacewater sampling will be conducted to monitor COC concentrations in the adjacent stream areas. To date (January 2009) COC concentrations have been below NCAC 2B standards. Surfacewater sampling point locations are depicted in **Plate 2**. Surfacewater sampling point SW-1 is located downstream of the landfill, and sampling point SW-2 is located upstream of the landfill, along Fredericks Branch. All surfacewater samples will be analyzed for Appendix I VOC and metals concentrations by EPA methods 8260 and 6010, respectively. The complete *Ground and Surfacewater Sampling and Analysis Plan* is presented as **Appendix B**.

5 EVALUATION OF EFFECTIVENESS AND REPORT SUBMITTALS

5.1 Evaluation of Effectiveness

As remediation progresses at the site certain changes in the physical and chemical characteristics of the contaminant plumes should occur. In all areas contaminant concentrations are expected to decrease over the period of remediation, thus resulting in a decrease in the physical extent of the plume. The various methods for evaluating the effectiveness are discussed in the sections below.

5.1.1 Qualitative and Quantitative Evaluation

Qualitative Evaluation

Qualitative methods include graphical analysis of groundwater analytical data over time in order to visualize changing trends in groundwater chemistry that are expected to occur over time as a result of the various remedial mechanisms/processes that are occurring at the site (e.g. biodegradation, phytoremediation, HRC injection). Examples of graphical analyses that will be used include, but are not be limited to, time-series graphs of contaminant concentrations and groundwater levels, distance-concentration graphs of analytical data, and mapping of the contaminant plumes over time. Specific biodegradation plume parameters (e.g. point attenuation rate, bulk attenuation rate, biodegradation rate) will be determined for the individual plume areas.

Quantitative Evaluation

Quantitative evaluation will be conducted through revised MODFLOW modeling, and through analysis of groundwater analytical data using statistical tests for significance. Statistical significance tests can be grouped into two types, *inter-well* and *intra-well. Inter-well* methods determine statistical significance by examining trends in contaminant concentrations from performance wells with respect to those from background wells, which are used as a control group. As remediation progresses, the performance well data is expected to exhibit decreases in contaminant concentrations, while contaminant concentrations in the background wells are expected to remain relatively stable. Background wells are selected on the basis of location (typically upgradient) and analytical history (non-impacted wells are best). *Intra-well* methods determine statistical significance within individual performance wells by examining historical analytical results (time series) for a given well, thus indicating if changing contaminant concentrations at a given well location result from either remedial activity or natural fluctuation. Comparisons of background well data with sentinel and compliance well data will also be performed to monitor groundwater contaminant movement over time.

Various types of significance tests have been developed to analyze differing types of data populations based upon characteristics such as distribution type (normal vs. non-normal), trend type (changing vs. non-changing), percentage of "non-detect" results for a given population, and the sample population size. This allows for the selection of particular methods that are appropriate for a given situation. For the remedial activity at the subject facility the following statistical tests are proposed for use, although others may be used as the course of remediation progresses:

- Wilcoxon Rank-Sum (Inter-well) - *normal or non-normal data, invariant trends, < 90% non-detects, >3 samples/per well.*
- Parametric Prediction Limit (Inter-well) – *normal data, varying trends,< 15% non-detects.*
- Parametric Prediction Limit (Intra-well) – *normal data, varying trends,≥ 4 samples/well, < 15% non-detects.*
- Non-Parametric Prediction Limit (Inter-Well & Intra-Well) – *normal or non-normal data, can tolerate high percentage of non-detects, compares recent to historical data.*

As indicated by the list above, it is important to note that prior to conducting any test of statistical significance a baseline of analytical data must first be established. For the MNA parameters listed in **Section 4.0** this baseline will consist of the four (4) semi-annual sampling events mentioned previously. *Since some plume areas do not have upgradient wells that are suitable for use as background wells, non-impacted compliance wells may be used if necessary for inter-well statistical analyses.*

5.1.2 Evaluation of MNA

Monitoring well MW-1 will continue to be used as a background well for inter-well statistical analysis of MNA data. The remaining monitoring wells will be used as performance and compliance wells.

5.2 Refining the Site Conceptual Model

Over the course of corrective action the site conceptual model will be refined in order to determine the appropriate course of remediation. Additional information on groundwater chemistry, site lithology, plume characteristics, etc. will be used to further improve understanding of contaminant fate and transport at the site, and to determine any changes to the approved remedial measures if necessary.

5.3 Report Submittals

Remediation Status Reports will be submitted on a semi-annual basis, within 30 days of receiving all complete laboratory analytical reports. An *Initial Status Report* will be submitted upon implementation of the selected remedial approach, and will detail all activities performed to initiate corrective action. All reports submitted shall include complete laboratory analytical reports, data tables, contaminant concentration trend graphs, groundwater flow maps, contaminant plume maps, and cross-sections, as per NCDENR-SWS guidelines.

6 CONTINGENCY PLAN

6.1 Contingency Plan

Should the selected remedial approach not perform as expected and/or the constituent concentrations do not decrease, a contingency plan will be needed. One remedial technology to supplement MNA of VOC concentrations is the introduction of hydrogen release compound (HRC) into the subsurface to enhance processes such as the reductive dechlorination of chlorinated hydrocarbons. HRC could be injected into monitoring wells MW-8 and MW-10, in addition to multiple injection points using truck-mounted direct push equipment. Since HRC can remain resident in the subsurface for over one year after introduction, a single injection only will be needed to implement this form of corrective action. An injection permit will be required from the NCDENR Underground Injection Control Section prior to implementation. *It must be noted that due to the persistence of HRC in the subsurface after initial injection, groundwater in the injection wells may not be of adequate quality to sample for 30-60 days after injection.*

6.2 Safeguard Measures and Site Security

Exposure pathways are limited to onsite contact with groundwater. Monitoring wells are cased and secured with locking well caps. Access to the site is limited during operational hours. Heavy vegetation limits access from other areas. Lenoir County owns the majority of the property surrounding the facility. Public water is available to the surrounding area. A passive horizontal gas venting system for methane extraction/collection was installed as part of the *Transition Plan.* [9]

Prior to the facility becoming a C&D landfill, the western unit of the sanitary landfill was closed with a 24 inch soil cap and vegetative cover. The vegetative cover acts as an erosion control measure and also aides in the evapotranspiration process to reduce infiltration. "(T)he natural evapotranspiration process of vegetation has been recognized and harnessed as an alternative cover method to reduce landfill infiltration."[11][page 392]

As with the western unit, side slopes of the eastern unit were closed with a 24 inch soil cap and vegetative cover. The top of the eastern unit was closed with a cohesive cap of 18 inches of soil with a permeability of 1 x 10^{-5} cm/sec, and 18 inches of erosive layer. Surfacewater is diverted from the landfill and is not impounded on the landfill property.

6.3 Revisions

Requests for modification of the approved corrective action and implementation schedule will be submitted in writing to the Solid Waste Section. No actions regarding modification will be implemented until written approval is received from the Division of Waste Management. Approval of changes to HRC injection will be required by the NCDENR Underground Injection Control Section prior to implementation.

7 SCHEDULE AND MAINTENANCE

7.1 Operations & Maintenance

Lenoir County will oversee day-to-day operation and upkeep of the remediation technology. Any equipment required for remediation will be the responsibility of Lenoir County. If problems with the remediation system arise, the Solid Waste Section will be notified and a written report will be issued. The Lenoir Department of Solid Waste can be contacted at (252) 566-4194 regarding daily activities.

7.2 Timeline

Implementation of corrective action will begin within 30 days of CAP approval. The MNA performance parameter baseline will be established during the July 2009 semi-annual sampling event. A timeline estimate for sampling events and performance evaluation is presented in **Table 8**.

8 FINANCIAL ASSURANCE REQUIREMENTS

In general accordance with 15A NCAC 13B .0546, demonstration of financial assurance was achieved through the local government financial test. The estimated cost to implement MNA sampling and monitoring over a 5-year period is *$55,000.*

9 COMPLETENESS OF CORRECTIVE ACTION

Results indicate that reduction of the low level contamination can be achieved through monitored natural attenuation. There is no indication that the contamination would reach the new relative point of compliance within a reasonable time period. Institutional controls limit access to the site. The source area has been capped to limit infiltration. There is no need to abandon the on-site non-potable water supply well as part of any corrective action at the facility.

Respectfully submitted,
MUNICIPAL ENGINEERING SERVICES COMPANY, P.A.

Sean K. Patrick, P.G.
Professional Geologist

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