

CIVIL/SANITARY/ENVIRONMENTAL ENGINEERS

SOLID WASTE MANAGEMENT

**Municipal  
Services**

**Engineering  
Company, P.A.**

SITE PLANNING/SUBDIVISIONS

SUBSURFACE UTILITY ENGINEERING (SUE)

July 22, 2011

Ming-Tai Chao, P.E.  
Environmental Engineer II  
NCDENR – Solid Waste Section  
401 Oberlin Rd.  
Raleigh, NC 27605

Fac/Perm/Co ID #	Date	Doc ID#
14553	07/27/2011	14578

54-03.  
my



Re: Application for Permit to Continue Operation  
Lenoir County C & D Landfill, Permit No. 54-03-CDLF-1997

Dear Mr. Chao:

In response to your March 18, 2011 letter, we submit the following:

**Section 1 – Operation Plan****Response to DWM Comment Numbers 1-3:**

Per your conversation/email with Wayne Sullivan, this will be submitted at a later date.

**Appendix A Facility Drawings****Response to DWM Comment Number 4:**

Drawing F1/Sheet 3 of 7 has been revised to show the C&amp;D on top of MSW acreage is 18 acres.

**Response to DWM Comment Number 5:**

No change necessary, see the response to DWM Comment 6.

**Appendix E Facility Plan****Response to DWM Comment Number 6:**

To increase the capacity, we would have to expand the fill area beyond the 18 acres. We do not wish to change this at the present time.

Please find enclosed 1 hard copy of the revised drawing and text. We will send an electronic copy when we submit the White Goods, Pallet, and LCID information. If you have any questions or need additional information please don't hesitate to give us a call.

Sincerely,  
MUNICIPAL ENGINEERING SERVICES CO., PA

Lisa H. Crawford  
Designer

Enclosures

Cc w/o Enclosures: Tom Miller, Solid Waste Director

**PERMIT APPLICATION  
FOR  
CONTINUED OPERATION**

**Lenoir County  
Construction and Demolition  
Landfill Facility**

**Permit Number: 5403-CDLF-1997**

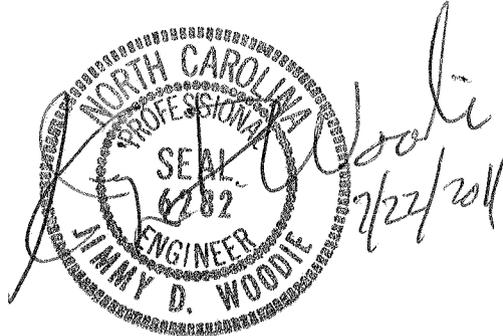
**Site Location: 2949 Hodges Farm Road  
La Grange, NC 28551**

**Applicant: County of Lenoir**

**Applicant's Address: 130 South Queen Street  
Kinston, NC 28502**

**MESCO Project Number  
G07062**

**Revised July 2011  
Revised March 2011  
Revised September 2010  
Revised August 2010  
Revised May 2009  
June 2008**



*Submitted By:*

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**Corporate License #0281**

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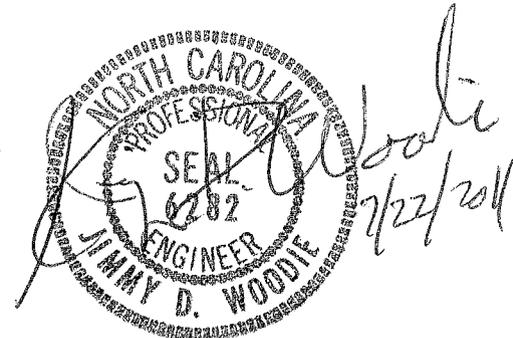
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SECTION 1.0

# OPERATION PLAN



## 1.1 Introduction

The County will continue to operate a Construction and Demolition Landfill (C&DLF) within the permitted boundaries and upon the closed unlined municipal solid waste (MSW) landfill. The unlined MSW area opened in 1982 and stopped receiving waste prior to October 9, 1991. The capped MSW stopped receiving waste in December of 1997, and was closed in 1998. The capped MSW was certified in March, 2000. The closed MSW areas have a minimum of two feet of final cover.

The County will implement a program at the landfill for detecting and preventing the disposal of hazardous and liquid wastes. The program consists of random inspection of incoming loads at a minimum of 1% of the weekly traffic. Landfill personnel will be trained to recognize hazardous and liquid wastes. Records will be kept on the training and the inspections. See Appendix C for detailed plan.

The County will monitor for explosive gases at landfill structures and the perimeter of the landfill. The concentration of methane gases generated by the landfill cannot exceed 25 percent of the lower explosive limit for methane in the structures, and it cannot exceed 100 percent of the lower explosive limit for methane of the landfill property boundary. If methane gas is found to exceed the acceptable limits at either the property boundary or landfill structures, it is the County's responsibility to do the following:

1. Immediately take all necessary steps to ensure protection of human health, (i.e. no smoking, etc.), temporarily abandon the structure and notify the Division of Waste Management (Division).
2. Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and
3. Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the Division that the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy.

See Section 1.4 for the Explosive Gas Control Plan.

Off-site and on-site erosion will be controlled through erosion control structures and devices. Provisions for a vegetative ground cover sufficient to restrain erosion will be accomplished within 30 working days or 120 calendar days upon completion of any phase of landfill development.

The County will record and retain at the landfill an operating record of the following information:

- (1) Inspection records, waste determination records, and training procedures;
- (2) Amounts by weight of solid waste received at the landfill;
- (3) Gas monitoring results and any remediation plans;
- (4) Any demonstration, certification, findings, monitoring, testing or analytical data required for surface and groundwater monitoring;
- (5) Any monitoring, testing or analytical data required for closure or post-closure;
- (6) Any cost estimates and financial assurance documentation.

All information contained in the operating record will be furnished upon request to the Division or be made available at all reasonable times for inspection by the Division.

Ground and surface water will be sampled and analyzed according to 40 CFR, Part 258, Appendix I detection monitoring requirements. The monitoring frequency for all Appendix I detection monitoring constituents will be at least semiannual during the life of the facility (including closure) and the post-closure period. A minimum of four independent samples from each well (background and downgradient) will be collected and analyzed for the Appendix I constituents during the first semiannual sampling event. At least one sample from each well (background and downgradient) will be collected and analyzed during subsequent semiannual sampling events. See Section 1.3 for the Ground water and Surface water Sampling and Analysis Plan.

If the County determines that there is a statistically significant increase over background for one or more of the constituents listed in Appendix I at any monitoring well at the relevant point of compliance, the County will, within 14 days of the finding, report to the Division of Solid Waste and place a notice in the operating record indicating which constituents have shown statistically significant changes from background levels. The County will establish an assessment monitoring program within 90 days. The County may demonstrate that a source other than the landfill caused the contamination or that the statistically significant increase resulted from an error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality. A report documenting these demonstrations will be certified by a Licensed Geologist or Professional Engineer and approved by the Division. A copy of this report will be placed in the operating record. If a successful demonstration is made, documented, and approved by the Division, the County may continue detection monitoring. If after 90 days, a successful demonstration is not made, the County will initiate an assessment monitoring program.

## **1.2 Operational Requirements**

### **1. Waste Acceptance and Disposal Requirements**

- a. The C&DLF will only accept those solid wastes which it is permitted to receive. The County will notify the Division within 24 hours of attempted disposal of any waste the landfill is not permitted to receive.
- b. Asbestos waste will be managed in accordance with 40 CFR 61. The regulated asbestos waste will be covered immediately with soil in a manner that will not cause airborne conditions and will be disposed of separate and apart from other solid waste, as:
  - i. in a defined isolated area within the foot print of the landfill, or
  - ii. in an area not contiguous with other disposal areas. Separate areas will be designated so that asbestos will not be exposed by future land-disturbing activities.
- c. Wastewater treatment sludges may be accepted, with the approval of the Division, either as a soil conditioner incorporated into or applied onto vegetative growth layer. The wastewater treatment sludge will neither be applied at greater than agronomic rates nor to a depth greater than six inches.
- d. Asphalt in accordance with G.S. 130-294(m) will be accepted;
- e. Inert debris from any source that is defined as solid waste which consists solely of material that is virtually inert, such as brick, concrete, rock and clean soil will be accepted;
- f. Construction materials, that could or would be part of any construction, remodeling, repair or demolition of pavement, buildings or other structures, from solid waste that is generated by mobile or modular home manufacturers and asphalt shingle manufacturers in the County. The waste must be source separated at the manufacturing site and must exclude municipal solid waste, hazardous wastes, and

other wastes prohibited from disposal in a C&DLF. It must be transported to the County C&DLF in a shipment or container that consists solely of the separated waste to be disposed of. The County C&DLF will not accept this waste if it has not been separated or transported as specified.

- g. Wooden pallets generated only from C&D activities.
- h. The following wastes are prohibited from disposal at the C&DLF:
  - i. Containers such as tubes, drums, barrels, tanks, cans, and bottles unless they are empty and perforated to ensure that no liquid, hazardous or municipal solid waste is contained therein.
  - ii. Garbage as defined in G.S. 130A-290(a)(7).
  - iii. Hazardous waste as defined in G.S. 130A-290(a)(8), to also include hazardous waste from conditionally exempt small quantity generators.
  - iv. Industrial solid waste unless a demonstration has been made and approved by the Division that the landfill meets the requirements of Rule .0503(2)(d)(ii)(A).
  - v. Liquid wastes.
  - vi. Medical waste as defined in G.S. 130A-290(a)(18)
  - vii. Municipal solid waste as defined in G.S. 130A-290(a)(18a)
  - viii. Polychlorinated biphenyls (PCB) wastes as defined in 40 CFR 761
  - ix. Radioactive waste as defined in G.S. 104E-5(14)
  - x. Septage as defined in G.S. 130A-290(a)(32)
  - xi. Sludge as defined in G.S. 130A-290(a)(34)
  - xii. Special waste as defined in G.S. 130A-290(a)(40)
  - xiii. White goods as defined in G.S. 130A-290(a)(44)
  - xiv. Yard trash as defined in G.S. 130A-290(a)(45)
  - xv. Wooden Pallets generated by means other than C&D activities
- i. The following waste will not be received if separate from C&DLF waste: lamps or light bulbs including but not limited to halogen, incandescent, neon or fluorescent; lighting ballast or fixtures; thermostats and light switches; batteries including but not limited to those from exit and emergency lights and smoke detectors; lead pipes; lead roof flashing; transformers; capacitors; and copper chrome arsenate (CCA) and creosote treated woods.
- j. Waste accepted for disposal in the C&DLF unit shall be readily identifiable as C&D waste and must not have been shredded, pulverized, or processed to such an extent that the composition of the original waste cannot be readily ascertained except in the case where the waste has come from a permitted recycling and reuse facility.

- k. The County will not knowingly dispose any type or form of C&D waste that is generated within the boundaries of a unit of local government that by ordinance:
    - i. Prohibits generators or collectors of C&D waste from disposing that type or form of C&D waste.
    - ii. Requires generators or collectors of C&D waste to recycle that type or form of C&D waste.
  - l. White Goods are received at this facility, in the designated area, but are not disposed of in the landfill.
2. Cover material requirements.
    - a. Except as in Subparagraph (c), the County must cover the solid waste with six inches of earthen material when the waste disposal area exceeds one-half acre and at least once weekly. Cover must be placed at more frequent intervals if necessary to control disease vectors, fires, odors, blowing litter and scavenging. A notation of the date and time of the cover placement must be recorded in the operating record, as specified in Paragraph 10 in this section.
    - b. Except as in Subparagraph (c), areas which will not have additional wastes placed on them for three months or more, but where final termination of disposal operations has not occurred, will place twelve inches of intermediate cover and stabilized with vegetative ground cover or other stabilizing material.
    - c. Alternative material or an alternative thickness of cover may be used, if the County demonstrates that the alternative material or thickness controls disease vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment, and is approved by the Division.
  3. Spreading and compacting requirements.
    - a. C&DLF units will restrict solid waste to the smallest area feasible.
    - b. Solid waste will be compacted as densely as practical into cells.
    - c. Fencing and/or diking will be provided within the area to confine solid waste which is subject to be blown by the wind. At the conclusion of each operating day, all windblown material resulting from the operation will be collected and disposed of by the County.
  4. Disease vector control
    - a. The County will prevent or control on-site populations of disease vectors using techniques appropriate for protection of human health and the environment.
    - b. "Disease vectors" means any rodents, flies, mosquitoes, or other animals, including insects, capable of transmitting disease to humans.
  5. Air Criteria and Fire Control
    - a. The County will ensure that the units do not violate any applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the U.S. EPA Administrator pursuant to Section 110 of the Clean Air Act, as amended.

- b. Open burning of solid waste, except for the approved burning of land clearing debris generated on-site or debris from emergency clean-up operations, is prohibited at all C&DLF facilities. *Prior to any burning a request will be sent to the Division for review and approval. In addition, the Division of Air Quality and local fire department must approve the activity prior to burning.* The Division will determine the burning to be approved if it is one of two types of burning previously referenced. A notation of the date of approval and the name of the Division personnel who approved the burning must be included in the operating record.
  - c. Equipment will be provided to control accidental fires. In the event of an emergency the operator(s) will call 911. The site is located in the La Grange Fire District and will be served by their volunteer fire department. Fire extinguishers are located in all buildings and on all equipment. Dirt piles are also on site to use in emergency situations.
  - d. Fires and explosions that occur at the C&DLF require verbal notice to the Division within 24 hours and written notification within 15 days. Written notification must include the suspected cause of fire or explosion, the response taken to manage the incident, and the action(s) to be taken to prevent the future occurrence of fire or explosion.
6. Access and safety requirements
- a. The C&DLF will be adequately secured by means of gates, chains, beams, fences and other security measures approved by the Division of Solid Waste Management to prevent unauthorized entry.
  - b. An attendant will be on duty at the site at all times while it is open for public use to ensure compliance with operational requirements.
  - c. The access road to the site and monitoring locations will be of all-weather construction and maintained in good condition.
  - d. Dust control measures will be implemented when necessary. If dust problems should arise, the County will use any reasonable means necessary to reduce it. At a minimum the County will spray water on necessary areas. Water sources for dust control will be from the existing sediment basins, existing creeks and existing on-site wells.
  - e. Signs providing information on tipping or disposal procedures, the hours during which the site is open for public use, the permit number and other pertinent information will be posted at the site entrance.
  - f. Signs will be posted stating that no hazardous or liquid waste can be received.
  - g. Traffic signs or markers will be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.
  - h. The removal of solid waste from the C&DLF will be prohibited unless the County has included in its operational plan a recycling program which has been approved by the Division. The general public is prohibited from removal activities on the working face.
7. Erosion and Sedimentation Control Requirements
- a. Adequate sediment control measures (structures or devices), will be utilized to prevent silt from leaving the landfill.
  - b. Adequate sediment control measures (structures or devices), will be utilized to prevent excessive on-site erosion.

- c. Provisions for a vegetative ground cover sufficient to restrain erosion will be accomplished within 30 working days or 120 calendar days upon completion of any phase of landfill development.
8. Drainage Control and Water Protection Requirements
- a. Surface water will be diverted from the operational area and will not be impounded over waste.
  - b. Solid waste will not be disposed of in water.
  - c. Leachate will be contained on site and properly treated prior to discharge.
  - d. The landfill will not:
    - (i) Cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements pursuant to Section 402.
    - (ii) Cause the discharge of a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirements of an area-wide or state-wide water quality management plan that has been approved under Section 208 or 319 of the Clean Water Act, as amended.
  - f. The County will inspect the exterior slopes of the landfill at least weekly to determine if there are any breakouts of leachate in the slopes. If any are discovered, they will be contained immediately to assure that they will not leave the site. The containment can consist but not be limited to an earthen berm, sand bags, erosion control logs and/or anything that will contain the leachate on the slope.

The repair of the breakout will require excavating into the cover soil on the slope down to the waste and into the waste to determine what is causing the leachate to come to the surface. Normally it is another layer of soil that has been used as cover and the leachate is flowing along that layer to the slope and surfacing on the slope. The lower layer of cover needs to be removed at the breakout so that the leachate that is flowing along this cover has a point where it will go vertically into the landfill instead of flowing along the soil boundary that was once either daily cover or an intermediate cover.

Once this soil layer has been breached, the excavation can be filled back with stone, clean waste or any material, other than soil, that will allow the leachate to flow vertically instead of horizontally. Once the excavation has been filled with this material, the surface can be cover with soil so that surface water does not intrude into the excavation. Vegetative cover will be reestablished over the excavated area.

9. Survey for Compliance

Within 60 days of a permittee's receipt of the Division's written request, the permittee will have a survey conducted of active and/or closed portions of the unit(s) at the facility in order to determine whether operations are being conducted in accordance with the approved design and operation plans. The permittee must report the results of the survey, including a map produced by the survey, to the Division within 90 days of receipt of the Division's request.

- a. A survey shall be required by the Division:
  - (i) If there is reason to believe that the operations are being conducted in a manner that deviates from the plan listed in the effective permit, or

- (ii) As verification that operations are being conducted in accordance with the plan listed in the effective permit.
  - b. Any survey pursuant to this Paragraph must be performed by a professional land surveyor duly authorized under North Carolina law to conduct such activities.
10. Record keeping Requirements
- a. The County will record and retain at the facility, or an alternative location near the facility approved by the Division, in an operating record the following information as it becomes available.
    - (i) Inspection records, waste determination records, and training procedures;
    - (ii) Amounts by weight of solid waste received at the landfill to include source of generation.
    - (iii) Any demonstration, certification, findings, monitoring, testing or analytical data required for surface, groundwater and gas monitoring;
    - (iv) Any monitoring, testing, or analytical data required for closure or post-closure;
    - (v) Any cost estimates and financial assurance documentation;
    - (vi) Notation of date and time of placement of cover material; and,
    - (vii) All audit records, compliance records and inspection reports.
    - (viii) Notation of approval date and the name of the Division personnel who approved the type of the open burning; and
    - (ix) Approved monitoring plan and corrective action plans.
  - b. All information contained in the operating record will be furnished to the Division of Solid Waste Management according to the permit or upon request, or be made available for inspection by the Division.
  - c. The operating record will also include a copy of the approved operation plan and all required permits.

### **1.3 Ground Water and Surface Water Sampling and Analysis Plan**

#### **Introduction**

#### **Objective**

The objective of the Ground and Surface water Sampling and Analysis Plan (SAP) is to provide clear guidelines and procedures for field and laboratory personnel when obtaining and testing ground and surface water samples. This plan is an update, and supersedes the November 1995 SAP for the Lenoir County C&D landfill on top of MSW landfill. The sampling procedures outlined in this analysis plan are guidelines by which sampling will be performed. Deviation from the procedures may be warranted depending on facility conditions or unforeseen sampling variables. Alternative sampling procedures must conform to the N.C. Water Quality Monitoring Guidance Document for Solid Waste Facilities (Guidance Document).

All groundwater and surface water monitoring points shall be sampled semi-annually for the constituents listed in Appendix II or Appendix I plus mercury. In addition to the Appendix II constituents, the monitoring wells will also be sampled for the following suite of Monitored Natural Attenuation (MNA) parameters as per SWS guidelines:

<i>MNA Performance Parameters</i>		
<b>Parameter</b>	<b>Analysis Type</b>	<b>Analytical Method</b>
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 <sub>2</sub>	Field Reading	
Alkalinity (Total as CaCO <sub>3</sub> )*	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.		

### Water Quality Monitoring Summary

The monitoring plan consists of seven (7) monitoring wells (MW-1, MW-3, MW-4, MW-6, MW-9, MW-11, and MW-12), and two (2) surface water monitoring points (SW-1 and SW-2).

Monitoring well MW-1 is the background well located upgradient of the MSW Landfill. MW-3 is a downgradient monitoring well located at the northeastern tip of the facility, designed to intersect groundwater flow coming from the center of the facility. MW-4 is a downgradient monitoring well on the eastern side of the sanitary unit. MW-6 is a downgradient well located near the scale house in the south western portion of the landfill, detecting contamination flowing in a more northern direction. MW-8 is a downgradient well located north of the landfill along the unpaved road, monitoring the center of the landfill as well as the property north of center. MW-9 is the northernmost downgradient monitoring well positioned to detect an unexpected release from the northeastern portion of the landfill, prior to reaching Fredrick's Branch. MW-10 is a downgradient monitoring well designed to intersect the northern groundwater flow from the southwest/south portion of the landfill based on transport by advection. MW-11 is a downgradient monitoring well for the southern portion. MW-12 is a downgradient well designed to intersect the northern groundwater flow from the southwest/south portion of the landfill.

Surface water sampling point SW-1 is located downstream of the landfill, and sampling point SW-2 is located upstream of the landfill, along Fredericks Branch.

Monitoring wells MW-3 and MW-4 were installed in September 1991, and MW-5 was installed in May 1992. It is unclear when monitoring well MW-6 was installed. There is no information on MW-7. Verbal communication with field personnel implied that MW-7 was not installed. Boring logs and/or well construction records for MW-6 and MW-7 could not be located.

### **Assessment Monitoring**

Assessment monitoring will be performed on all monitoring locations. Assessment monitoring will consist of collection of groundwater for analysis for the Appendix II listed constituents. Additionally, field parameters including dissolved oxygen (DO), oxidation reduction potential (ORP), pH, temperature, turbidity, and conductivity will also be recorded.

### **Sampling Equipment**

Groundwater purging and sampling will be performed using a submersible pump and disposable polyethylene bailers. A new bailer will be used to sample each individual well. *Under no circumstance will a disposable bailer used to sample a given well be used to sample any remaining well.* The following procedure will be used to decontaminate the submersible pump:

1. Phosphate-free detergent & de-ionized or distilled water rinse.
2. De-ionized or distilled water rinse.
3. Isopropyl alcohol (isopropanol) rinse.
4. De-ionized or distilled water rinse.

A new bailer will be used to sample each individual well. *Under no circumstance will a disposable bailer used to sample a given well be used to sample any remaining well.*

At least one (1) equipment blank will be collected during pump decontamination procedures to ensure that cross-contamination has not occurred as a result of the decontamination process. The standard equipment necessary to conduct sampling for each well consists of:

- Sample containers (including trip blanks and equipment blanks)
- Wide-mouth container
- Bailing twine
- Disposable latex/nitrile gloves
- Temperature/pH/ORP/conductivity indicator
- Electronic water level indicator
- Transport or storage coolers with ice.

All equipment subject to damage and contamination will be transported in sealed, plastic bags or storage containers. The water level indicator will be decontaminated in accordance with Steps 2 and 3 described above prior to placement in a clean plastic bag or storage container.

### **Sampling Containers**

Ground and surface water monitoring will include organic (volatile organic compounds- VOCs) and inorganic (metals) analyses. Samples will be collected for the various analyses in laboratory supplied containers.

1. Each sample container will be clearly labeled providing the following information: site name, county location, sample identification number, parameters to be analyzed, preservative added, date and time of sampling, and initials of the sampler.
2. Samples to be analyzed for VOC concentrations will be collected first in three 40-ml glass vials with Teflon septa caps. The sample vials will be completely filled to create zero headspace in the vials.
3. Samples to be analyzed for inorganic contamination will be collected second in a quart/1-liter polyethylene container.

All sample containers will be obtained from an independent laboratory in a sterilized condition and with the appropriate, method-specific preservative. Care will be taken by the field technician to not allow the preservative to wash out of the sample containers during sampling.

## MNA Sampling Containers

Groundwater samples to be analyzed for MNA performance parameters will be collected into the container types listed in the table below.

MNA Parameter	Volume	Bottle Type	Preservative
Alkalinity	250 mL	Plastic	none; cool to 4°C
Chloride	125 mL	Plastic	none; cool to 4°C
TOC/COD	250 mL	Glass	Sulfuric acid (H <sub>2</sub> SO <sub>4</sub> )
BOD	500 mL	Polyethylene	none; cool to 4°C
Iron	125 mL	Plastic	Nitric acid (HNO <sub>3</sub> )
Nitrate	125 mL	Plastic	Sulfuric acid (H <sub>2</sub> SO <sub>4</sub> )
Sulfate	125 mL	Plastic	none; cool to 4°C
Sulfide	250 mL	Glass	Sodium hydroxide (NaOH)
Methane/Ethane/Ethene	125 mL	Plastic	none; cool to 4°C
Hydrogen	-	-	proprietary lab sampler
Volatile Fatty Acids	40 mL	Glass	Hydrochloric Acid (HCl)

## SAMPLING

Wells will be sampled from upgradient to downgradient; or when previous analytical data is available, from least to greatest contamination. This procedure is required to limit the potential of cross contamination between sampling points.

A clean sheet of plastic will be placed around the well to provide a clean surface for sampling equipment. The total well depth read from the well tag and the measured depth to water, determined using the water level indicator, will be used to compute the depth of water in the well. The total well depth will be measured and compared to the depth indicated on the well tag as a check for silt buildup or blockage at depth.

All meters used to monitor purge parameters will be calibrated immediately prior to purging and sampling, and those readings recorded in a field logbook. Entries will always include pre- and post-calibration readings as well as the model and serial number of the equipment and the date, time, and person performing the calibration(s). Two standards, which bracket the average or suspected measurements for pH and specific conductance, will be used at the site. Since natural waters (including those impacted by environmental contaminants) tend to have pH values less than 7.0, pH buffers of 4.0 and 7.0 will typically be used for instrument calibration.

Disposable nitrile gloves will be worn by the field technician during sampling to minimize the risk of personal exposure to potentially harmful chemical substances and to minimize the risk of sample cross-contamination. Fresh pairs of nitrile gloves will be worn during each purge and sampling event. The groundwater samples will be transferred from the bailers into method-specific and appropriately preserved containers and placed into a clean cooler containing ice to chill the samples to a temperature of approximately 4°C.

Indicator parameters such as pH, temperature and specific conductance will be measured during purging as an indication that groundwater representative of the formation surrounding a given well is being sampled. Purging is considered complete when at least three well volumes have been purged and indicator parameters have stabilized such that three successive readings vary by no more than 10%. Purging may need to be continued beyond five well volumes if indicator parameters have not stabilized. All information will be recorded on a field data sheet or in a field logbook with copies submitted to the Division of Waste Management with the analytical results.

## PURGING

Each well will be purged of approximately three (3) to five (5) volumes of standing water and allowed to settle prior to collection of groundwater samples. If the well should go dry and not recharge before the requisite well volumes are removed, the well will be allowed to recharge and a sample will be collected within 24 hours of the initial purging. The amount of standing water will be calculated by first subtracting the depth-to-water from total well depth.

After determination of the amount of water to be purged from a given well, the equipment necessary for purging will be assembled at the well. The disposable bailer will be maintained in a stable, upright position while the upper portion of the plastic wrapping will be pulled away to expose only the eyelet used for securing twine to the bailer. After the twine has been secured to the bailer with gloved hands, the bailer will be suspended as the remaining plastic is removed. The bailer will be lowered slowly into the well until the bailer contacts groundwater. The bailer twine will then be cut to an adequate length and secured to prevent loss of the bailer in the well. At no time during purging will the bailer twine be allowed to touch the ground. In order to not allow the twine to touch the ground during purging, the twine will be collected when raising the bailer either by loops gathered in one hand or by alternating hand-to-hand as the bailer is pulled from the well. When purging deep wells (in excess of 40 feet), the ground and the well head may be covered with a clean plastic bag or sheet of plastic with a slit cut to allow the plastic to slide over the well head. This will be a separate sheet of plastic from the one used for the sampling equipment.

### **Groundwater Sample Collection**

The bailer will be lowered slowly into the well to avoid volatilization of any dissolved-phase compounds that may be present in the groundwater. Once full, the bailer will be retrieved and containers filled by emptying the water through the hole at the bottom of the bailer. Glass 40-mL vials for VOC analyses will be filled in such a manner as to produce zero headspace in the vials. Polyethylene containers for metals analyses will be filled and sealed with the cap, leaving about ½-inch of airspace at the top. In addition to collecting the samples, water will be collected in the wide-mouth container for pH, temperature, and conductivity measurements. Upon completion of sampling, all groundwater samples, including equipment and trip blanks, will be placed in labeled and sealed plastic bags and stored in ice-filled coolers to chill the samples to 4°C pending transport to a NCDENR-certified analytical laboratory. Contaminated nitrile gloves and twine will be discarded.

### **Surface Water Sample Collection**

Surface water sampling will be taken with given consideration to minimize turbulence and aeration. As during groundwater sampling, surface water samples will be collected by a field technician wearing disposable gloves. Containers will be dipped at sampling location points by gently dipping the sample container into surface water and allowing surface water to flow over the mouth of the container so as not to displace any preservative within the sample container. If there is little current movement, the container will be moved slowly through the water laterally. During times of low water, if the water is not deep enough to allow filling of sample containers, an appropriately decontaminated sampling cup will be used to retrieve the sample. All containers will be treated in the same manner as the groundwater samples. The samples will be sealed in labeled, plastic bags, and stored in an ice-filled cooler to chill the samples to 4°C pending transport to a NCDENR-certified analytical laboratory.

### **Chain of Custody**

Chain-of-custody forms will be used to document the handling of all samples collected and listing all individuals who have taken possession of a given set of samples, including field personnel, laboratory couriers, and laboratory personnel. Trip blanks, equipment blanks, and sample containers will all travel and be stored together. Trip blanks will remain in the condition they are received from the laboratory and will not be opened or tampered with during the sampling. A chain-of-custody record will be completed for each day's samples, indicating the date and time, sample location, sample matrix (soil, water, etc.), and laboratory analyses to be conducted.

### **Analysis**

When the water samples reach the laboratory, they will be transferred to a sample custodian who will sign the chain of custody documentation as receipt of the samples. Internal control of the water samples in the laboratory will be in accordance with QA/QC procedures for the laboratory. Copies of QA/QC manuals for approved laboratories are on file at the Division of Solid Waste.

Groundwater and surface water samples will be analyzed for the Appendix II list of constituents; QA/QC procedures utilized during the testing will be in conformance with the laboratory QA/QC manual. Monitoring wells MW-1, MW-3, MW-4, MW-6, MW-9, MW-11, and MW-12 will be sampled for the Appendix II list and the aforementioned MNA performance parameters.

Upon completion of the remedy, the County will submit a report to the Division documenting that the remedy has been completed in compliance with Rule .1637(e). This report will be signed by the County and by a Licensed Geologist or Professional Engineer. Upon approval by the Division, this report will be placed in the operating record.

When, upon completion of the certification, the Division determines that the corrective action remedy has been completed in accordance with Rule .1637(e), the County will be released from the requirements for financial assurance for corrective action under Rule .1628(d).

#### **1.4 Explosive Gas Control Plan**

Quarterly, the County Landfill will monitor the explosive gas at the landfill structures, existing methane monitoring probes, and at/near the landfill boundary. The permanent probes consist of a plastic stand pipe similar to a piezometer used for groundwater detection. A typical permanent methane probe is detailed in the operation drawings.

The existing permanent methane probes are surrounding the Closed MSW Landfill Limits. The location and spacing of the methane probes is somewhat arbitrary. The locations were determined by the relationship of solid waste with property lines and landfill structures. The spacing of the monitoring probes is between 200 and 400 feet. The migration of methane gas is induced by pressure gradients. The methane will move from areas of high pressure to those of low pressure following the path of least resistance. The methane will migrate vertically until it reaches the landfill cap, where it will begin to flow horizontally. This occurs until it finds a pathway out, either by the installed methane collection trenches or migration through the permeable *in situ* soils. Since methane is lighter than air, it wants to escape into the atmosphere. It has been our experience that whenever gas is migrating no matter what the spacing or depth of the monitoring probes, the gas will fill the void created by the monitoring point and an explosive meter will monitor the level. The various depths of the monitoring probes are to ensure a stable monitoring point. The only time a shallow monitoring point has not worked is in a very heavy, impermeable clay layer that acts as a seal to the migration of the gas. The permanent probes are surrounding the Closed MSW Landfill Limits.

The gas can be detected by use of an instrument that reports the percent of lower explosive limit. The instrument being used is the Gas Tech GP 204.

Based on current conditions, there are nine (9) existing monitoring points. Quarterly, a County employee will visit each monitoring point. The monitoring points consist of all methane probes. Using the detection instrument, he will determine if methane gas has filled the probes. If the probe is near the property line and methane gas is detected at or beyond the lower explosive limit (100% LEL), it must then be determined if the gas is migrating across the landfill boundary. If the probe is on the boundary or methane gas has migrated beyond the boundary, a remediation plan must be completed by Lenoir County.

Other points of monitoring will be the landfill structures. Each structure will be monitored for methane using the following methods:

1. All crawl spaces will be monitored;
2. All corners in the structure will be monitored;
3. Any holes, cracks and pipes through the foundation will be monitored

If methane gas is detected beyond 25% of its lower explosive limit in any structure, check the calibration of the monitor and resample. If the reading is still above 25%, evacuate the building and try to find the source of gas. If the source is found try to remove the source. If this fails a remediation plan is stated in the operational requirements.

**SECTION 2.0**

**CLOSURE  
PLAN**

## **2.1 Introduction**

The Division of Solid Waste Management requires that the Engineer certifies the constructed cap is built according to approved plans and specifications. The Engineer that will accomplish this task is the one who did the planning and has written the specifications.

Before construction can begin a pre-construction meeting will be held and the responsibilities and duties of each party will be discussed.

The Contractor is responsible for following and meeting the requirements set forth in the contract documents. The Contractors will provide to the Owner of the landfill and the Engineer a completed landfill constructed by Division's approved plans and specifications. The Contractor will give the Engineer a schedule for completion of the landfill including dates for expected construction of the cohesive soil test pad, cohesive soil cap, erosive layer, and estimated time for project completion. The contractor is responsible for providing a foreman to remain on site at all times during construction, provide qualified personnel to conduct quality control, scheduling and coordinating the subcontractors, provide progress reports and as-built drawings, and coordinating construction activities with the Engineer. The foreman is responsible for supervising and coordinating with his crew, subcontractors, quality control personnel, attending all meetings and notifying the Engineer's Construction Observer when any discrepancies occur. The Contractor will meet with the Construction Observer on a daily basis to discuss the days construction activities. The results of all tests and any change in schedule shall be given to the Construction Observer as soon they are known by the contractor. The Contractor must be registered in the state of North Carolina.

The Engineer is responsible for providing the engineering design, drawings and specifications, contract documents and Construction Quality Assurance(CQA) needed for construction of the landfill. The Engineer is responsible for conduction of the pre-construction meeting, which will lay out the foundation for the project. The engineer will approve any design changes and certify to the Division of Solid Waste Management that the cap was constructed according to the requirements of Rule .0541 CQA Plan and .0540 Construction requirements for C&D Facilities, and Division approved plans and specifications. This will be accomplished by on-site observation and independent laboratory soil testing to test site specific soil properties including permeability. The Engineer will be providing Quality Assurance by spot testing along side the contractor, who will be providing the Quality Control. The Engineer will certify that the construction was completed in accordance with the CQA manual. The Engineer must be a professional engineer registered in North Carolina.

The Construction Observer (CO) is the Engineer's representative on-site. It is the CO's responsibility to know and interpret the plans and specifications of the project. On a daily basis the CO will coordinate with the Foreman to help ensure a quality product for the Owner. The CO will keep a daily log on the activities of the Contractor, keep notes on all meetings, and handle all quality assurance activities indicated in this document. The CO will keep a log of all material delivered on site and ensure the materials meets or exceeds the specifications indicated in this report. If the need arises additional meetings will be scheduled as determined by the CO.

The estimate of the maximum inventory of wastes ever on-site over the active life of the landfill facility is 284,070 tons from FY 97-98 through FY 07-08.

Prior to beginning closure, the County shall notify the Division that a "Notice of the Intent to Close" the unit has been placed in the operating record. The County shall begin closure activities no later than thirty (30) days after the date on which the landfill receives the final wastes, or if the landfill has remaining capacity and there is a reasonable likelihood that the landfill will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be granted by the Division if the County demonstrates that the landfill has the capacity to receive additional waste and the County has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the closed landfill.

The County shall complete closure activities in accordance with the closure plan within 180 days following the final receipt of waste. Extensions of the closure period may be granted by the Division of Solid Waste if the County demonstrates that closure will, of necessity, take longer than one hundred eighty (180) days and the County has taken and will continue to take all steps to prevent threats of human health and environment from the enclosed landfill.

Following closure of the landfill, the County shall notify the Division that a certification, signed by the project engineer verifying that closure has been completed in accordance with the closure plan, and has been placed in the operating record. The County shall record a notation on the deed to the landfill property and notify the Division of Solid Waste that the notation has been recorded and a copy has been placed in the operating record. The notation on the deed shall in perpetuity notify any potential purchaser of the property that the land has been used as a landfill and its use is restricted under the closure plan approved by the Division of Solid Waste. The County may request permission from the Division to remove the notation from the deed if all waste is removed from the landfill.

## **2.2 Cap System**

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches of intermediate cover, 18 inches of cohesive soil with a permeability no greater than  $1.0 \times 10^{-5}$  cm/sec, and 18 inches of erosive layer. The cap will contain gas venting system consisting of a series of washed stone trenches below the soil liner that will be vented through 10" diameter PVC pipes that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices. The largest area currently requiring a cap system will be 18.0 acres.

## **2.3 Cohesive Soil Cap**

All materials and equipment shall be furnished by an established and reputable manufacturer or supplier. All materials and equipment shall be new and shall be of first class ingredients and construction, designed and guaranteed to perform the service required and shall conform with the following standard specifications or shall be the product of the listed manufacturers or similar and equal thereto as approved by the Engineer.

### **Cohesive Soil Cap Borrow Material**

<b>Test Name</b>	<b>Test Method</b>	<b>Contractor/Engineer Frequency</b>
Moisture/Density	ASTM D698/D1557	1 per 5000 c.y.
Remolded Permeability	ASTM D5084	1 per 5000 c.y.
Atterberg Limits	ASTM D4318	1 per 5000 c.y.
Visual Classification	ASTM D2488	1 per 5000 c.y.
Grain Size Distribution	ASTM D422	1 per 5000 c.y.

### **Cohesive Soil Cap Test Pad**

<b>Test Name</b>	<b>Test Method</b>	<b>Contractor/Engineer Frequency</b>
Field Moisture/Density	ASTM D1556 (sand cone) ASTM D2922/D3017 (nuclear gauge) ASTM D2937 (drive cylinder)	3 per lift
Permeability	ASTM D5084	1 per lift
Remolded Permeability	ASTM D5084	1 per lift
Atterberg Limits	ASTM D4318	1 per lift
Visual Classification	ASTM D2488	1 per lift
Grain Size Distribution	ASTM D422	1 per lift

### In-Place Cohesive Soil Cap

Test Name	Test Method	Contractor/Engineer Frequency
Field Moisture/Density	ASTM D1556 (sand cone) ASTM D2922/D3017 (nuclear gauge) ASTM D2937 (drive cylinder)	1 per lift per acre
Permeability	ASTM D5084	1 per lift per acre
Atterberg Limits	ASTM D4318	1 per lift per acre
Visual Classification	ASTM D2488	1 per lift per acre
Grain Size Distribution	ASTM D422	1 per lift per acre

(a) Suitable on-site and/or off-site soils may be used as cohesive soil cap if it can achieve an in-place permeability of  $1.0 \times 10^{-5}$  cm/sec or less and meets all testing requirements indicated in the material testing paragraph in this section. Wyoming bentonite or an approved equivalent may be blended with the soil to lower the soil's permeability.

(b) A permeability "window" shall be developed for each type of soil from the borrow material that will be used for construction of the cohesive soil cap. The window shall be plotted on a semi-log plot with moisture content versus density. Laboratory testing to develop the window shall include a series of remolded samples compacted to various dry densities and moisture contents utilizing the same compactive effort (ASTM D 698 or D 1557). The remolded samples shall be tested for permeability to determine whether or not the particular soil type will provide the maximum permeability ( $1.0 \times 10^{-5}$  cm/sec) at various dry densities and moisture contents. The window is then developed from the accepted remolded samples and moisture contents from the semi-log plot. A straight line is typically drawn between the acceptable points on the moisture-density curve to indicate a range of probable acceptable permeability results. The window will be used in the construction of the test strip to verify the laboratory remolded permeability results.

(c) Atterberg Limits (ASTM D4318) and grain size distribution (ASTM D422) and visual classification (ASTM D2488) shall also be conducted on the bulk samples used to prepare the permeability window. These tests can be used as indices on random samples collected from the borrow site during construction to verify the soil type is the same as was used to develop the "window". As a minimum, sufficient visual classifications and Atterberg Limits shall be conducted in association with each permeability test to verify that the construction materials meet specifications.

(d) A test strip of compacted cohesive soil cap shall be prepared to verify the permeability "window" prior to general installation of the cohesive soil cap. The test strip will be used to verify the results from the remolded permeabilities from the borrow site utilizing the permeability window(s) for each soil type that is going to be used for construction of the cohesive soil cap. At a minimum, the verification will consist of three moisture density tests, one Atterberg limits test, one grain size distribution test (ASTM D2488, D4318, and D422), and one Shelby Tube sample for each lift constructed in the test pad. Laboratory permeability tests shall be performed on tube (Shelby or drive tubes) samples of the cohesive soil cap after placement and compaction. The permeability must be a maximum of  $1.0 \times 10^{-5}$  cm/sec. Tests shall be performed in accordance with the ASTM D5084. The test strip shall be approximately 2,500 sq. ft. in surface area and constructed to conform geometrically to the site topography with a minimum lateral dimension in any direction of 25 ft. The test strip shall consist of at least three compacted 6 inch lifts of cohesive soil cap. Placement and testing of the test strip shall be in conformance with the construction specifications and requirements for general installation of the cohesive soil cap. Test results from the test strip shall be used to guide placement and achievement of the required maximum permeability of  $1.0 \times 10^{-5}$  cm/sec of the cohesive soil cap. The test strip may be used as an integral part of the overall cohesive soil cap if it meets the required specification for the cap. All results shall be given to the Construction Observer.

(e) The soils shall be placed to the total thickness shown on the plans in maximum 8-inch thick loose lifts with a maximum 6" compacted lift compacted preferably at a moisture content between 0 to 3% above optimum moisture content to 95% standard Proctor maximum dry density (ASTM Test Designation D698). A sheepsfoot roller or approved alternative may be used to compact the soil cap provided the compaction and permeability requirements can be achieved. Each lift shall be tested for permeability, moisture content, particle size distribution analysis, Atterberg limits, moisture-density-permeability relation, and if needed percent bentonite admixed with soil, prior to the placement of the succeeding lift and visually inspected to confirm that all soil clods have been broken and that the surface is sufficiently scarified so that adequate bonding can be achieved. Soils for cohesive soil cap shall be screened, disked, or prepared using any other approved method as necessary to obtain a homogeneous cohesive soil with clod sizes in a soil matrix no larger than about 1.5 inches in maximum diameter. After each lift, the surface shall be scarified prior to the placement of the next lift to provide good bonding from one lift to the next.

(f) The cohesive soil cap shall be tested to evaluate the coefficient of permeability. The coefficient of permeability of the soil cap shall be equal to or less than  $1.0 \times 10^{-5}$  cm/sec after placement and compaction. The soil cap must be a minimum of 1.5 feet thick.

(g) Laboratory permeability tests shall be performed on tube (Shelby or drive tubes) samples of the cohesive soil cap after placement and compaction. The permeability must be a maximum of  $1.0 \times 10^{-5}$  cm/sec. Tests shall be performed in accordance with ASTM D5084.

(h) The soil cap shall be tested a minimum of one soil sample per lift per acre for laboratory permeability. All permeability testing will be on random samples judged by the Engineer to be representative of the most permeable soil conditions for the area being tested. The project engineer shall certify that the materials used in construction were tested according to the Division approved plans. If after placement of the soil cap it fails the required tests, the material will either be reworked or replaced and then retested for permeability. The soil cap must remain moist at all times, if any section becomes dry, rework the dry area and moisten.

(i) A minimum of two (2) inches of soil shall be removed prior to securing each sample for permeability testing. The sampling tube shall be advanced vertically into the soil with as little soil disturbance as possible and should be pushed using a uniform pressure. The sampling tube (Shelby tube), when extracted, shall be free of dents, and the ends shall not be distorted. A backhoe or approved alternative should be used to advance the sampling tube (Shelby tube) as long as disturbance is minimized. Drive tube samples of the cap may be obtained for permeability testings. If the Engineer judges the sample to be too disturbed, another sample shall be taken. Once an acceptable sample has been secured and properly prepared, all sample excavations shall be backfilled to grade with a 50% mixture of bentonite and similar soils in maximum 3-inch loose lifts and hand tamped with a blunt tool to achieve a tight seal equivalent to the original density.

(j) No additional construction shall proceed on the soil layers at the area being tested until the Engineer has reviewed the results of the tests and judged the desired permeability is being achieved.

(k) As a minimum, sufficient visual classifications (ASTM Test Designation D2488), analyses (ASTM Test Designation D422) and Atterberg limits (ASTM Test Designation D4318) shall be conducted in association with each permeability test to verify that the construction materials meet specifications. The minimum number of tests will be 1 per lift per acre.

(l) If the soil for the cohesive soil cap is incapable of achieving the required permeability when compacted, bentonite or approved alternative may be mixed with the soils to decrease the permeability. The amount of additive required must be determined in the laboratory. Where additives are required, the soil shall be placed in maximum 8-inch thick loose lifts and compacted preferably between 0 to +3% optimum moisture content to 95% standard Proctor maximum dry density (ASTM Test Designation D698) for the soil-additive mixture. All other compaction procedures for the soil apply.

(m) The Contractor shall protect the cohesive soil cap from desiccation, flooding and freezing. Protection, if required, may consist of a thin plastic protective cover, (or other material as approved by the engineer) installed over the completed cohesive soil cap until such time as the placement of flexible membrane liner begins. Areas found to have any desiccation cracks or which exhibit swelling, heaving or other similar conditions shall be replaced or reworked by the contractor to remove these defects.

(n) The thickness and grade of the soil cap will be verified by the surveyor. The soil cap will be surveyed at 100' grid points where the elevations of the top of landfill will be checked with the top of soil cap to verify 1.5 feet of soil cap. The grade will then be verified with the surveyed information. The survey will be performed by North Carolina Professional Land Surveyor.

## **2.4 Erosive Layer**

The soil for the erosive layer shall consist of any soils suitable of supporting vegetative growth.

(a) Native vegetation will be used as recommended in the NC Erosion and Sediment Control Planning and Design Manual and as shown in the Closure Plan drawings in Appendix A.

(b) The thickness and grade of the erosive layer will be verified by the surveyor. The erosive soil layer will be surveyed at 100 foot grid points where the elevations of the top of landfill will be checked with the top of soil cap to verify 1.5 feet of erosive soil layer. The grade will then be verified with the surveyed information. The survey will be performed by North Carolina Professional Land Surveyor.

## **2.5 Methane Venting System**

### **Gas Venting System**

NC.D.O.T. No.5 stone, Geotextile fabric, and 8" and 10" plastic pipes will be used in the construction of the Gas venting system.

#### **(1) Stone in Trenches and Surrounding Perforated Collection Piping**

Stone for methane collection system shall meet the requirements of NC DOT aggregate, standard size No. 5 and shall contain no fines. Stone must pass the sieve analysis test for No. 5 stone performed at the quarry.

#### **(2) Geotextile Fabric**

Geotextile fabric surrounding the stone/piping shall be non-woven needle punched fabric with the following minimum properties:

1) Weight	8.0 oz/yd <sup>2</sup>	ASTM D-3776
2) Grab Strength	205 lbs.	ASTM D-4632
3) Grab Elongation	50%	ASTM D-4632
4) Trapezoidal Tear Strength	85 lbs.	ASTM D-4533
5) Puncture Strength	100 lbs.	ASTM D-4833
6) Mullen Burst Strength	320 psi	ASTM D-3786
7) Permittivity	1.4 sec <sup>-1</sup>	ASTM D-4491

Geotextile fabric shall be manufactured by Polyfelt , TNS Advanced Technologies, or approved equal.

### (3) Plastic Pipe

Plastic gravity sewer pipe and fittings used for methane vent shall be unplasticized polyvinyl chloride (PVC) and conform to the requirements of ASTM Designation D-3034 on ASTM F679, Type PSM, Class 12454-B, SDR-35 with elastomeric gasket joints. PVC pipe and fittings shall be as manufactured by J-M Pipe, Certainteed, H&W Industries or equal. The methane riser pipe shall be a 10 inch solid wall PVC pipe.

The methane gas venting system on top of the landfill will be constructed after all phases of filling have been completed.

## **2.6 Construction Quality Assurance(CQA) Report**

The CQA report will contain the results of all the construction quality assurance and construction quality control testing including documentation of any failed test results, descriptions of procedures used to correct the improperly installed material, and results of all retesting performed. The CQA report will contain as-built drawings noting any deviation from the approved closure plans and will also contain a comprehensive narrative including, but not limited to, daily reports from the project engineer, a series of color photographs of major project features, and documentation of proceedings of all progress and troubleshooting meetings. The CQA report shall be certified, signed, dated, and sealed by a professional engineer registered in the State of North Carolina.

## 2.7 Closure Costs

The largest area to be closed within the permitted life will be 18 Ac. Post Closure will be 30 years after closure.

Closure Costs:

Closure will consist of the following which costs are estimated as being done by a third party.

1. 18" of  $1 \times 10^{-5}$  cm/sec. soil cover, surface preparation;
2. Erosion Control Devices;
3. 18" Erosive layer;
4. Seeding and Mulching;
5. Mobilization/Demobilization, machine /equipment costs, and fuel costs;
6. Labor Costs;
7. Stone for methane gas collection.
8. Geotextile for methane gas collection.
9. Vent pipes for methane gas collection, and
10. Engineering Costs and QA/QC of the Composite liner and certification of closure, including CQA field monitoring and lab testing, CQA reporting and certification, construction administration and bidding, Survey as-builts and recordation fees.

Estimate of Probable Costs:

1. 18" of  $1 \times 10^{-5}$  cm/sec. soil cover for 18 acres:  
(including surface preparation)

Total yardage + 15% = 50,094 yd<sup>3</sup> @ a cost of \$9.00/yd<sup>3</sup>  
∴ Cost = \$450,846

2. Erosion Control devices

Estimated costs @ \$75,000  
∴ Cost = \$107,000

3. 18" Erosive soil layer for 18 acres.

Total yardage + 15% = 50,094 yd<sup>3</sup> @ a cost of \$4.00/yd<sup>3</sup>  
∴ Cost = \$200,376

4. Seeding and Mulching for 18 acres.

Estimated cost of \$2,000/acre  
∴ Cost = \$36,000

5. Mobilization/Demobilization.  
(including Machine/Equipment costs and fuel costs)

Estimated cost of \$249,000

6. Labor Costs.

Estimated cost of \$200,000

∴ Cost = \$285,000

7. Stone for methane gas collection.

Total estimated linear feet =1,978 ft.

Total estimated volume for a 2'x1' trench = 3,956 ft<sup>3</sup>

with a density of 120 lbs/ft<sup>3</sup> total weight =238 tons @ a cost of \$25.00/ton

∴ Cost = \$5,950

8. Geotextile for methane gas collection.

Total estimated linear feet = 1,978 ft.

Total estimated perimeter for a 2'x1' trench =

(1978 ft × 6 ft )=11,868 ft<sup>2</sup> @ a cost of \$0.20/ ft<sup>2</sup>

∴ Cost = \$2,374

9. Vent pipes for methane gas collection.

Estimated cost @ \$600.00 each (10vents).

∴ Cost = \$6,000

10. Engineering Costs and QA/QC of the Composite liner and certification of closure.  
(including CQA field monitoring and lab testing, CQA reporting and certification,  
construction administration, construction documentation and bidding, Survey as-builts  
and recordation fees)

Estimated cost = \$200,000

∴ Cost = \$200,000

Total of Estimated Closure Costs:

1.	\$	450,846
2.	\$	107,000
3.	\$	200,376
4.	\$	36,000
5.	\$	249,000
6.	\$	285,000
7.	\$	5,950
8.	\$	2,374
9.	\$	6,000
10.	\$	<u>200,000</u>

Total: \$ 1,542,246

SECTION 3.0

# POST-CLOSURE PLAN



### **3.1 Introduction**

#### **CONTACTS:**

Name:	Tom Miller
Title:	Solid Waste Director
Phone No.:	(252) 566-4194
Address:	2949 Hodges Farm Rd. Kinston, NC 28501

#### **DESCRIPTION OF USE:**

The County has no future use planned for their landfill at this time. However, any future use of the landfill shall not disturb the integrity of the cap system, base line system or any other components of the containment system or the functioning of the monitoring systems.

#### **DESCRIPTION OF MAINTENANCE ACTIVITIES:**

The County Landfill will be monitored quarterly for evidence of settlement, subsidence and ponding in the cap system. The entire site will be monitored quarterly for evidence and effects of erosion. The erosion control plan will be preserved. All gates, fencing, access roads, and signs shall be maintained appropriately. Annually in the Spring, the vegetative cover will be monitored to assure a good stand of vegetation, and where needed, it will be reseeded. The vegetative cover will be mowed twice a year, once in mid-summer and again in early fall. These maintenance activities will take place over the entire post closure period of thirty years. The County will make repairs as necessary to maintain the integrity and effectiveness of the Cap System.

#### **DESCRIPTION OF MONITORING ACTIVITIES:**

The County Landfill will monitor and analyze ground and surface water semi-annually for Subtitle D Appendix I constituents for a period of thirty years. The County will also monitor methane gas at landfill structures and the boundary quarterly for the thirty-year period.

The County will inspect the exterior slopes of the landfill at least weekly to determine if there are any breakouts of leachate in the slopes. If any are discovered, they will be contained immediately to assure that they will not leave the site. The containment can consist but not be limited to an earthen berm, sand bags, erosion control logs and/or anything that will contain the leachate on the slope.

The repair of the breakout will require excavating into the cover soil on the slope down to the waste and into the waste to determine what is causing the leachate to come to the surface. Normally it is another layer of soil that has been used as cover and the leachate is flowing along that layer to the slope and surfacing on the slope. The lower layer of cover needs to be removed at the breakout so that the leachate that is flowing along this cover has a point where it will go vertically into the landfill instead of flowing along the soil boundary that was once either daily cover or an intermediate cover.

Once this soil layer has been breached, the excavation can be filled back with stone, clean waste or any material, other than soil, that will allow the leachate to flow vertically instead of horizontally. Once the excavation has been filled with this material, the surface can be cover with soil so that surface water does not intrude into the excavation. Vegetative cover will be reestablished over the excavated area.

#### **COMPLETION OF POST-CLOSURE CARE**

Following completion of the post-closure care period for each unit, the owner or operator will notify the Division of Solid Waste that a certification, signed by a registered professional engineer, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

### 3.2 Post Closure Costs

The largest closed area to be monitored within the post closure life will 47 acres.

#### **Post Closure Costs:**

Methane gas, ground water and surface water will be monitored for 30 years after closure. The cap will also have to be monitored for the 30 year period. All costs include reports, data analysis, and certifications.

1. Ground and Surface Water monitoring semiannually for 30 years for appendix I constituents and statistical analysis.  
Estimated cost/sample = \$840.00/sample  
Total annual samples = 2(7 wells + 2 surface) = 18 samples/year  
Estimated cost = 30 years x 18 samples/year x \$840.00/sample =  
  
∴ Cost = \$453,600
2. Methane Gas monitoring quarterly for 30 years.  
Estimate \$600.00/quarter = \$2,400.00/year  
Estimated cost = 30 year x \$2,400.00 = \$72,000.00  
  
∴ Cost = \$72,000.00
3. Cap Monitoring and repairing (including maintenance of all gates, fencing, access roads and signs, mowing and revegetation)  
  
Estimate \$12,500/year for the 30 years.  
  
∴ Cost = \$375,000
4. Closure of sedimentation and erosion control devices.  
  
Estimate \$84,000.00 for closure
5. Maintenance of gas vents, monitoring wells, etc.  
  
Estimate \$6,900/year for the 30 years.  
  
∴ Cost = \$207,000
6. Administration/Record keeping/Certification  
  
Estimate \$6,500/year for 30 years  
  
∴ Cost = \$195,000

#### Total of Estimated Post Closure Costs:

1.	\$ 453,600
2.	\$ 72,000
3.	\$ 375,000
4.	\$ 84,000
5.	\$ 207,000
6.	<u>\$ 195,000</u>
Total:	\$ 1,386,600

**SECTION 4.0**

**FINANCIAL  
RESPONSIBILITIES**

APPENDIX A

**FACILITY DRAWINGS,  
ENGINEERING/  
OPERATION DRAWINGS  
AND  
CLOSURE DRAWINGS**

APPENDIX B

# LOCAL GOVERNMENT APPROVALS



APPENDIX C

**WASTE SCREENING  
PLAN**

## APPENDIX C

### **A. INTRODUCTION**

The municipal solid waste stream is made up of wastes from all sectors of society. The waste is often categorized by its source or its characteristics. Terms used include commercial, industrial, residential, biomedical, hazardous, household, solid, liquid, demolition/construction, sludge, etc. Regardless of how one classifies wastes, the bottom line is that wastes are delivered to the landfill and a management decision must be made to either reject or accept them. This responsibility rests with the manager of the landfill. Wastes which are not authorized to be accepted at the landfill create a number of potential problems including: (1) liability due to future releases of contaminants; (2) bad publicity if media learns of unacceptable waste entering the landfill; (3) potential for worker injury; (4) exposure to civil or criminal penalties; (5) damage to landfill environmental control systems.

### **B. HAZARDOUS WASTE REGULATIONS AND MANAGEMENT**

In the United States, hazardous waste is regulated under RCRA, Subtitle C. A waste is hazardous if it is listed as a hazardous waste by the Administrator of the Environmental Protection Agency (EPA) in the Code of Federal Regulations, Title 40, Part 261, or if it meets one or more of the hazardous waste criteria as defined by EPA. These criteria are:

- Ignitability
- Corrosivity
- Reactivity
- Toxicity

#### **1. Ignitability**

Ignitable waste is a waste that burns readily, causes a fire by friction under normal circumstances, or is an oxidizer. Any waste having a flash point of <140F falls in this category. Flash point is that temperature at which a liquid gives off vapors that will ignite when an open flame is applied. Under Department of Transportation (DOT) definitions, a flammable liquid has a flash point of >100 F. A combustible liquid has a flash point between 100 and 200 F. Therefore, a flammable liquid is always hazardous while a combustible liquid may or may not be hazardous depending upon its flash point.

#### **2. Corrosivity**

A corrosive waste is one having a very high or a very low pH. The pH of a liquid is a measure of how acidic or basic (alkaline) the material is. The pH scale ranges from 0 to 14. High numbers are basic and low numbers are acidic. A substance having a pH  $\leq 2.0$  or  $\geq 12.5$  is defined as hazardous under RCRA.

#### **3. Reactivity**

A waste is reactive if it is normally unstable: reacts violently with water; forms an explosive mixture with water; contains quantities of cyanide or sulfur that could be released to the air; or can easily be detonated or exploded. These wastes may fall into any one of several DOT categories.

#### 4. Toxicity Characteristic Leaching Procedure (TCLP)

A waste is TCLP toxic if the concentration of any constituent in Table 1 exceeds the standard assigned to that substance. The TCLP is a methodology which attempts to simulate the conditions within a landfill. An acidic solution is passed through a sample of waste and the resultant "leachate" is analyzed for contaminants. The TCLP is designed to detect heavy metals, pesticides and a few other organic and inorganic compounds. The purpose of the test is to prevent groundwater contamination by highly toxic materials. TCLP tests the mobility of 40 different elements and compounds.

Except in certain specified circumstances, regulated quantities of hazardous waste must be disposed of at a permitted hazardous waste disposal facility. In accordance with 40 CFR Part 261.3, **any material contaminated by a hazardous waste is also deemed to be a hazardous waste and must be managed as such.** Hazardous waste from conditionally exempt small quantity generators are to be disposed of in a Hazardous waste disposal facility. RCRA permits are also required to store, transport, and treat hazardous waste.

#### C. POLYCHLORINATED BIPHENYL'S (PCBs)

##### 1. Introduction

PCBs are nonflammable and conduct heat without conducting electricity. These compounds were most frequently used as an additive to oil or other liquids in situations where heat was involved. The PCBs enhance the heat conducting properties of the liquid and thereby increase the heat dissipation or cooling effect obtained. They have also been used in lubricants and paint. In the United States one of the most common applications was in electric transformers. The only effective method for destroying PCBs is high Temperature incineration which is relatively expensive due to a shortage of PCB incineration capacity.

TABLE 1

<b>T.C.L.P. CONSTITUENTS &amp; REGULATORY LEVELS (mg/L)</b>			
CONSTITUENT	REG LEVEL	CONSTITUENT	REG LEVEL
Arsenic	5.0	Hexachlorobenzene	0.13
Barium	100	Hexachloro-1,3-butadiene	0.5
Benzene	0.5	Hexachloroethane	3.0
Cadmium	1.0	Lead	5.0
Carbon Tetrachloride	0.5	Lindane	0.4
Chlordane	0.03	Mercury	0.2
Chlorobenzene	100	Methoxychlor	10.0
Chloroform	6.0	Methyl ethyl ketone	200
Chromium	5.0	Nitrobenzene	2.0
m-Cresol	200	Pentachlorophenol	100
o-Cresol	200	Pyridine	5.0
p-Cresol	200	Selenium	1.0
Cresol	200	Silver	5.0
1,4-Dichlorobenzene	10.0	Tetrachloroethylene	0.7
1,2-Dichloroethane	0.7	Toxaphene	0.5
1,1-Dichloroethylene	0.5	Trichloroethylene	0.5
2,4-Dichlorophenoxyacetic acid	0.7	2,4,5-Trichlorophenol	400
2,4-Dinitrotoluene	0.13	2,4,6-Trichlorophenol	2.0
Endrin	0.02	2,4,5-TP (Silvex)	1.0
Heptachlor (and its hydroxide)	0.008	Vinyl Chloride	0.2

By law PCB's are no longer used as dielectrics in transformers and capacitors manufactured after 1979. There are many millions of pounds of PCBs still in use or in storage. One example is the ballasts used in fluorescent light fixtures. It has been estimated that there are between 0.5 million and 1.5 billion ballasts currently in use in this country. Due to the long life of these units, about half of these may be of pre-1979 manufacture and contain PCBs. Since each ballast contains about one ounce of nearly pure PCB fluid, there are about **20 to 30 million pounds** of PCBs in existing lighting fixtures. These items are not the subject to RCRA Subtitle D Waste Screening!

Commercial or industrial sources of PCB wastes that should be addressed by the program include:

- Mineral oil and dielectric fluids containing PCBs;
- Contaminated soil, dredged material, sewage sludge, rags, and other debris from a release of PCBs;
- Transformers and other electrical equipment containing dielectric fluids; and
- Hydraulic machines.

## 2. PCB Regulatory Requirements

As contrasted to hazardous wastes, the Toxic Substance Control Act regulates PCBs based on the concentration of PCBs in the waste rather than the source or characteristic of the waste. The regulations concerning PCB disposal are spelled out in 40 CFR Part 761. Subtitle D of RCRA merely requires that PCB waste not be disposed in a MSW landfill. PCB management requirements include:

Waste containing more than 500 ppm of PCBs must be incinerated. Waste containing from 50 to 500 ppm must be disposed of by incineration, approved burning, or in chemical waste landfill permitted to receive such wastes. The regulations are silent concerning wastes containing less than 50 ppm of PCBs; however, the regulations cannot be circumvented by diluting stronger wastes.

## D. FUNDAMENTALS OF WASTE SCREENING

### 1. Know Your Generators and Haulers

Since the level of sophistication of your waste screening program will be a reflection of the likelihood of hazardous waste and PCB waste being in your incoming waste, **knowledge of the commercial industrial base of your service area is critical.** Some examples are the automotive industry, which generates solvents, paint wastes, lead acid batteries, grease and oil; the dry cleaning industry, which may generate filters containing dry cleaning solvents; metal platers which generate heavy metal wastes; and other industries which generate a variety of undesirable wastes; e.g. chemical and related products, petroleum refining, primary metals, electrical and electronic machinery, etc.

Landfill managers should also know the haulers and trucks serving the businesses in their community which are likely to carry unacceptable wastes.

Some local governments and solid waste management agencies have enacted legislation requiring haulers to provide a manifest showing the customers whose wastes make up that particular load. Such a manifest is an extremely useful tool when a load is found to contain prohibited wastes. It is unwise to accept wastes from unknown, unlicensed, or otherwise questionable haulers.

## 2. Inspections

An inspection is typically a visual observation of the incoming waste loads by an individual who is trained to identify regulated hazardous or PCB wastes that would not be acceptable for disposal at the C&DLF unit. The training of landfill personnel will be conducted by a local EMS official or a SWANA certification. An inspection is considered satisfactory if the inspector knows the nature of all materials received in the load and is able to discern whether the materials are potentially regulated hazardous wastes or PCB wastes.

Ideally, all loads should be screened; however, it is generally not practical to inspect in detail all incoming loads. Random inspections, therefore, can be used to provide a reasonable means to adequately control the receipt of inappropriate wastes. Random inspections are simply inspections made on less than every load. At a minimum the inspection frequency will not be less than one percent of the waste stream.

The frequency of random inspections may be based on the type and quantity of wastes received daily, and the accuracy and confidence desired in conclusions drawn from inspection observations. Because statistical parameters are not provided in the regulation, a reasoned, knowledge-based approach may be taken. A random inspection program may take many forms such as inspecting every incoming load one day out of every month or inspecting one or more loads from transporters of wastes of unidentifiable nature each day. If these inspections indicate that unauthorized wastes are being brought to the C&DLF site, the random inspection program should be modified to increase the frequency of inspections.

Inspection priority also can be given to haulers with unknown service areas, to loads brought to the facility in vehicles not typically used for disposal of C&D waste, and to loads transported by previous would-be offenders. For wastes of unidentifiable nature received from sources other than households (e.g., industrial or commercial establishments), the inspector should question the transporter about the source/composition of the materials.

An inspection flow chart to identify, accept, or refuse solid waste is provided as Figure 1.

Inspections of materials may be accomplished by discharging the vehicle load in an area designed to contain potentially hazardous wastes that may arrive at the facility. The waste should be carefully spread for observation using a front end loader or other piece of equipment. The Division recommends that waste should be hand raked to spread the load. Personnel should be trained to identify suspicious wastes. Some indications of suspicious wastes are:

- Hazardous placards or markings;
- Liquids;
- Powders or dusts;
- Sludges;
- Bright or unusual colors;
- Drums or commercial size containers; or
- Chemical odors.

The County will follow these procedures when suspicious wastes are discovered.

- Segregate the wastes;
- Dispose of non-C&D waste in designated container(s) for transport off-site;
- Question the driver;
- Review the manifest (if applicable);
- Contact possible source;
- Call the Division;
- Use appropriate protective equipment;
- Contact laboratory support if required; and

- Notify the local Hazardous Material Response Team.

Containers with contents that are not easily identifiable, such as unmarked 55-gallon drums, should be opened only by properly trained personnel. Because these drums could contain hazardous waste, they should be refused whenever possible. Upon verifying that the solid waste is acceptable, it may then be transferred to the working face for disposal.

Testing typically would include the Toxicity Characteristic Leaching Procedure (TCLP) and other tests for characteristics of hazardous wastes including corrosivity, ignitability, and reactivity. Wastes that are suspected of being hazardous should be handled and stored as a hazardous waste until a determination is made.

If the wastes temporarily stored at the site are determined to be hazardous, the County is responsible for the management of the waste. If the wastes are to be transported from the facility, the waste must be: (1) stored at the MSWLF facility in accordance with requirements of a hazardous waste generator, (2) manifested, (3) transported by a licensed Treatment, Storage, or Disposal (TSD) facility for disposal.

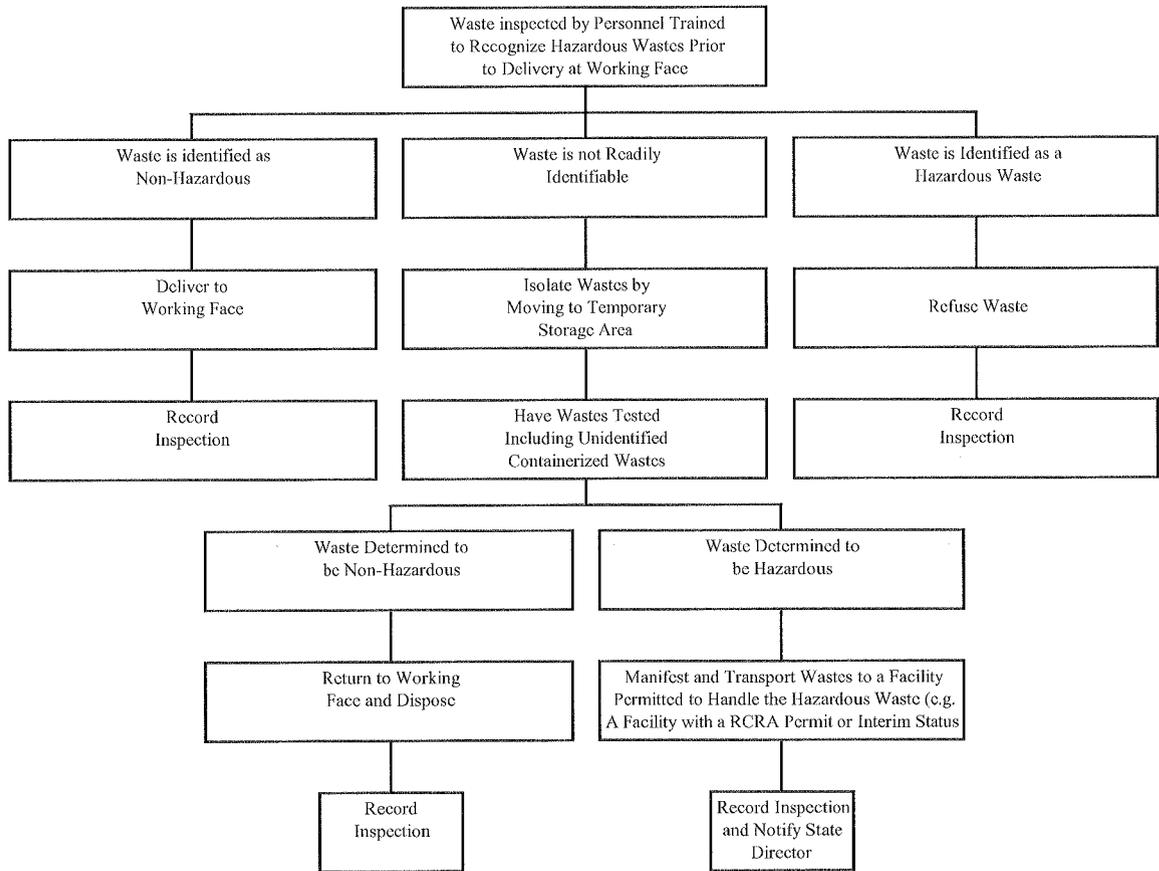
#### **E. RECORD KEEPING AND NOTIFICATION REQUIREMENTS**

Records must be kept pursuant to an incident where regulated hazardous waste or prohibited waste is found at the landfill. It is also recommended that records be kept of all screening activities and incidents, whether or not, regulated or prohibited wastes are found. This will help prove that the landfill owner/operator has acted in a prudent and reasonable manner.

The best way to prove compliance with this requirement is to document each inspection including:

- Date and time of waste detection
- Hauler name (company and driver)
- Waste(s) detected
- Waste generator(s) if able to identify
- Action(s) taken to manage or return material(s)
- Efforts taken if extreme toxicity or hazard was discovered
- Landfill employee in responsible charge

40 CFR Part 258 requires that records should be maintained at or near the landfill site during its active life and as long after as may be required by the appropriate state or local regulations.



**FIGURE 1**  
**Hazardous Waste Inspection Decision Tree**  
**Inspection Prior to Working Face**

## WASTE SCREENING CHECK LIST

<b>CONTAINERS</b>	<b>YES</b>	<b>NO</b>
FULL.....	_____	_____
PARTIALLY FULL.....	_____	_____
EMPTY.....	_____	_____
CRUSHED.....	_____	_____
PUNCTURED.....	_____	_____
<b>POWDERS/DUSTS</b>		
IDENTIFIED.....	_____	_____
UNKNOWN.....	_____	_____
SATURATION.....	_____	_____
LABEL/HAZARDOUS.....	_____	_____
<b>ODOR/FUMES</b>		
STRONG.....	_____	_____
FAINT.....	_____	_____
HEAT.....	_____	_____
<b>ITEMS FOUND</b>		
BATTERIES.....	_____	_____
OIL.....	_____	_____
BIOMEDICAL.....	_____	_____
RADIOACTIVE.....	_____	_____
ASHES/RESIDUE.....	_____	_____
SOD/SOIL.....	_____	_____
LIQUID.....	_____	_____
HAZARDOUS.....	_____	_____
PCB'S.....	_____	_____

**CHECK ALL THAT APPLY**

**DETAILED SCREENING REPORT**

WASTE SOURCE \_\_\_\_\_  
ADDRESS \_\_\_\_\_

PROBABLE [ ]                      SUSPECTED [ ]                      CONFIRMED [ ]

WASTE HAULER \_\_\_\_\_  
ADDRESS \_\_\_\_\_

DRIVER'S NAME \_\_\_\_\_  
DETAIL \_\_\_\_\_

**NOTIFIED:**

WASTE SOURCE [ ]    HAULING MANAGEMENT [ ]    SITE MANAGEMENT [ ]

STATE [ ]                      FEDERAL [ ]

NAME \_\_\_\_\_

WITNESS (IF ANY) \_\_\_\_\_

DATE \_\_\_\_\_ TIME \_\_\_\_\_ AM    PM

**ACTION REQUIRED**

APPENDIX D

**STATE AND LOCAL  
CONTACT INFORMATION**

STATE AND LOCAL CONTACT INFORMATION

NC Division of Waste Management Office:

Solid Waste Field Operation Branch  
Fayetteville Regional Office  
Eastern Regional Supervisor

Phone: (910) 433-3300

Local Hazardous Material Response Team:

Emergency: 911

Lenoir County Emergency Services

Phone: (252) 526-666

Local Fire Department:

Emergency: 911

La Grange Volunteer Fire Department

Phone: (252) 566-4515

Local Sheriff's Department:

Emergency: 911

Lenoir County Sheriff's Department:

Phone: (252) 559-6100



APPENDIX E

**WRITTEN  
FACILITY PLAN**

## Introduction

The County will continue to operate a Construction and Demolition Landfill (C&DLF) within the permitted boundaries and upon the closed unlined municipal solid waste (MSW) landfill. The unlined MSW area opened in 1982 and stopped receiving waste prior to October 9, 1991. The capped MSW stopped receiving waste in December of 1997, and was closed in 1998. The capped MSW was certified in March, 2000. The closed MSW areas have a minimum of two feet of final cover.

## General

The existing C&DLF unit is located a minimum of 50' from the property lines, 500' from existing wells, and 50' from any stream, river or lake.

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches intermediate cover, 18 inches of cohesive soil with a permeability no greater than  $1.0 \times 10^{-5}$  cm/sec, and 18 inches of erosive layer. The cap contains gas venting system consisting of a series of washed stone trenches below the soil liner that will be vented through pipes that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices.

The total permitted C&D capacity is 1,039,420 (1997 Submittal) cubic yards. The existing closed MSW footprint is approximately 47 acres in size.

## Landfill Capacity

The Life Expectancy calculations were calculated for Phases 3-6 of development with a vertical expansion being included when a Phase is constructed adjacent to the previous Phase. Each successive phase will vary in size due to being able to expand onto the previously filled areas. The Operation Plan of the Engineering Report will delineate this more clearly. The airspace is a net volume excluding the capping requirements.

### LIFE EXPECTANCY CALCULATIONS PHASES 3-6

Given:

Life expectancy based on actual survey dated May 8<sup>th</sup>, 2009 Fiscal Year 08-09 is as follows:

Life expectancy based on using the survey is 23,868 cubic yards/year, for the first year and an annual increase of 3.1% for each year thereafter.

<u>Phases</u>	<u>Airspace Available</u>	<u>Years of Life</u>
Phase 3	= 120,865 cubic yards	= 5.06 years
Phase 4	= 129,090 cubic yards	= 5.30 years
Phase 5	= 125,572 cubic yards	= 5.05 years
Phase 6	= 154,326 cubic yards	= 6.08 years
	529,853 cubic yards	21.49 years

Soil requirements for construction, daily cover and final caps for Phases 3-6

(Assume an 8:1 Trash to soil ratio)

Soil needed for Intermediate and Daily Cover	= 58,873 cubic yards
Soil needed for Closure	= 87,120 cubic yards (18 acres)
Overall Soil Requirements	= 145,993 cubic yards (soil needed for closure and daily cover)

The County also owns property which it will utilize for borrow material as needed. There should be enough borrow material available to complete the landfill. If the need arises the County will purchase additional land to borrow from. Estimated schedule of closure will be approximately 21.49 years.