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SOLID WASTE SECTION
ASHEVILLE REGIONAL OFFICE

June 30, 2008

Mr. Ming-Tai Chao, P.E.
Solid Waste Permitting Section
Division of Waste Management
North Carolina Department of Environment and Natural Resources
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

RE: Closure Plan
Construction & Demolition Landfill Unit 1
Madison County Landfill
Madison County, North Carolina
Permit # 58-03

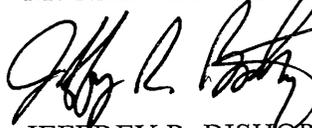
Dear Mr. Chao:

On behalf of Madison County, McGill Associates is pleased to present this Closure Plan for the Unit 1 Construction & Demolition Landfill (C&DLF) at the Madison County Landfill. C&DLF Unit 1 received its last waste January 2008 and the County began Closure activities on February 19, 2008. Enclosed is the Closure and Post-Closure Plan (1 hard copy and 1 electronic copy) for C&DLF Unit 1. The Plan was prepared in accordance with Section .0510 of the North Carolina Department of Environment and Natural Resources - Solid Waste Management Rules.

Madison County will continue to operate its C&DLF Unit 2. A updated Closure and Post Closure Plan has been submitted under separate cover for the Unit 2 waste area. Additional Financial Assurance information will be provided to you from Madison County as the County completes its FY2008 accounting after June 30, 2008.

We look forward to working with you in order to obtain Closure Status for the Madison County C&DLF Unit 1. Please let us know if you have any questions regarding this submittal or if you require additional information.

Sincerely,
McGILL ASSOCIATES, P.A.



JEFFREY R. BISHOP, P.E.
Senior Project Manager

Enclosures

cc: Allen Gaither, NCDENR Solid Waste Section, w/1 copy of enc
Ed Mussler, NCDENR Solid Waste Section, w/o enc
Jim Huff, Madison County Director of Solid Waste, w/1 copy of enc

CLOSURE AND POST-CLOSURE PLAN
CONSTRUCTION and DEMOLITION
LANDFILL UNIT 1
MADISON COUNTY, NORTH CAROLINA

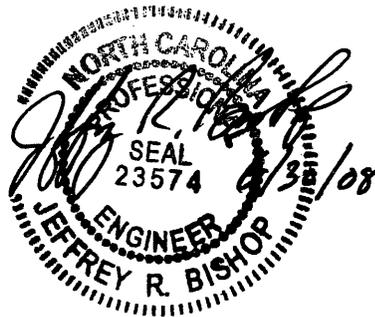
JEFFREY R. BISHOP, P.E.



Engineering • Planning • Finance
Asheville, North Carolina

June 2008

08.00700



CLOSURE AND POST-CLOSURE PLAN
Construction & Demolition Landfill Unit 1
Madison County, North Carolina

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CLOSURE AND POST-CLOSURE PLAN
Madison County Landfill
Construction & Demolition Landfill–Unit 1
Madison County, North Carolina

Chapter 1
Overview

The final cap system for Unit 1 of the Construction and Demolition Landfill (CDLF) located at the Madison County Landfill Facility was constructed in a progressive manner. As substantial areas of the landfill were brought to final grade, the cap system was constructed in order to minimize infiltration of stormwater, control erosion, and establish and maintain a vegetated cap. The CDLF Unit 1, which covers a total area of approximately 4.7 acres, was originally operated as an LCID landfill. In 1995, a permit modification was issued that allowed the County to operate the CDLF Unit 1 as a construction and demolition landfill. An expansion of CDLF Unit 1 was approved on June 2, 2003. CDLF Unit 1 reached capacity in January 2008. Closure activities began in February 2008 and verification of final grades was completed on June 24, 2008.

1.0 Cap Description and Construction

A detail of the final cap is shown on Figure 1. The cross-section consists of a minimum 24-inch layer of compacted on-site soils suitable to support vegetative cover. The final cap grades are shown on Figure 2.

1.1 Cap Foundation (Intermediate Cover)

The cap foundation cover (intermediate cover) is designed to minimize infiltration of stormwater into the landfill prior to placement of the final cap, and to provide a sound working platform over the solid waste. The compacted intermediate cover will extend over the entire waste area and consist of compacted soil with a minimum thickness of 12 inches.

1.2 Methane Gas Removal System

Since the majority of the materials disposed of in the CDLF, Unit 1 will be non-organic in nature, there will not be a methane gas removal system installed as part of this project.

1.3 Final Cover

The final cover will be a total of a minimum of 24-inches thick. The soil cover will be suitable to provide support for a vegetative cover.

1.3a Materials Required

A grass cover is proposed for the Landfill to provide the required cover while minimizing cap maintenance. The surface will be prepared by fertilizing and placing seed in accordance with the North Carolina Erosion and Sediment Control Standards. The final cover will be constructed of native soils. Although the material will not be required to have a specific classification or permeability, it should be a cohesive soil. The following guidelines shall be met to establish a permanent vegetative cover of the cap:

i. Fertilizer:

The soil material shall be tested prior to spreading to determine the amount of fertilizer that should be added to achieve optimum growth potential of the required vegetative cover.

The quality of fertilizer and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Fertilizer Law and regulations adopted by the North Carolina Board of Agriculture.

Fertilizer shall be 10-10-10 grade. Upon written approval of the Engineer a different grade of fertilizer may be used, provided the rate of application is adjusted to provide the same amounts of plant food.

During handling and storing, the fertilizer shall be cared for in such a manner that it will be protected against hardening, caking, or loss of plant food values. Any hardened or caked fertilizer shall be pulverized to its original conditions before being used.

ii. Lime:

The soil material shall be tested prior to spreading to determine the amount of lime that should be added to achieve optimum growth potential of the required vegetative cover.

The quality of lime and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Lime Law and regulations adopted by the North Carolina Board of Agriculture.

During the handling and storing, the lime shall be cared for in such a manner that it will be protected against hardening and caking. Any hardened or caked lime shall be pulverized to its original condition before being used.

Lime shall be agriculture grade ground dolomitic limestone. It shall contain not less than 85% of the calcium and magnesium carbonates and shall be of such fineness that at least 90% will pass a No. 10 sieve and at least 50% will pass a No. 100 sieve.

iii. Seed:

The quality of seed and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Seed Law and regulations adopted by the North Carolina Board of Agriculture.

Seed shall have been approved by the North Carolina Department of Agriculture or any agency approved by the Engineer before being sown, and no seed will be accepted with a date of test more than nine (9) months prior to the date of sowing. Such testing however, will not relieve the Contractor from the responsibility of furnishing and sowing seed that meets these specifications at the time of sowing. When a low percentage of germination causes the quality of the seed to fall below the minimum pure live seed specified, the Contractor may elect, subject to the approval of the Engineer, to increase the rate of seeding sufficiently to obtain the minimum pure live seed contents specified, provided that such an increase in seeding does not cause the quantity of noxious weed seed per square yard to exceed the quantity that would be allowable at the regular rate of seed.

During handling and storing, the seed shall be cared for in such a manner that it will be protected from damage by heat, moisture, rodents, or other causes.

Seed shall be entirely free from bulblets or seed of Johnson Grass, Nutgrass, Sandbur, Wild Onion, Wild Garlic, and Bermuda Grass. The specifications for restricted noxious weed seed refers to the number per pound, singly or collectively, of Blessed Thistle, Wild Radish, Canada Thistle, Corncockle, Field Bindweed, Quackgrass, Dodders, Dock, Horsenettle, Bracted Plantain, Buckhorn or Wild Mustard; but in no case shall the number of Blessed Thistle or Wild Radish exceed 27 seeds of each per pound. No tolerance on weed seed will be allowed.

iv. Mulch:

Straw mulch shall be threshed straw of oats, rye or wheat free from matured seed of obnoxious weeds or other species which would grow and be detrimental to the specified grass.

1.3b Construction Requirements

Soil shall be placed according to the following requirements:

- i. The soil shall be spread by utilizing small equipment with a relatively low ground pressure. This will reduce the potential of the underlying layers of the final cap being damaged. The upper 6-inches of compacted soil shall be clear of materials larger than 2" in diameter.
- ii. After alignment of the underlying soil, loosen and till to a depth of 6 inches by disking, harrowing, rototilling, or other approved methods to assure that the upper soil layer properly adheres to the underlying soil layer.

- iii. After the condition of the soil layer has been approved by the on-site CQA personnel, prepare the seedbed in accordance with the approved CDLF Unit 1 Technical Specifications.

Seed, fertilizer and lime shall be applied according to the following:

Seed shall be applied by means of a hydro-seeder or other approved methods. The rates of application of seed, fertilizer and limestone shall be as stated below, unless pre-construction testing is contrary to these rates and can be documented.

All rates are in pounds per acre:

Fertilizer (10-10-10) – 1,000 lbs. per acre

Lime – 4,000 lbs. per acre

KY-31 Fescue – 100 lbs. per acre

Straw mulch – 60 to 80 bales

If hydro-seeding is used, wood cellulose may be substituted for straw mulch at the rate of 1,000 lbs. per acre.

For summer seeding the following shall be added:

- German Millet - 10 lbs. per acre
- Sudan grass – 15 lbs. per acre

For winter seeding the following shall be added:

- Rye grain – 15 lbs. per acre

For steep slopes (2:1 or steeper) the following shall be added:

- Sericea Lespedeza – 40 lbs. per acre

Equipment to be used for the application, covering or compaction of limestone, fertilizer, and seed shall have been approved by the Engineer before being used on the project. Approval may be revoked at any time if equipment is not maintained in satisfactory working condition, or if the equipment operation damages the seed. Limestone, fertilizer, and seed shall be applied within 24 hours after completion of seedbed preparation unless otherwise permitted by the Engineer, but no limestone or fertilizer shall be distributed and no seed shall be sown when the Engineer determines that weather and soil conditions are unfavorable for such operations.

Limestone may be applied as a part of the seedbed preparation, provided it is immediately worked into the soil. If not so applied, limestone and fertilizer shall be distributed uniformly over the prepared seedbed at the specific rate of application and then harrowed, raked, or otherwise thoroughly worked or mixed into the seedbed.

Seed shall be distributed uniformly over the seedbed at the required rate of application, and immediately harrowed, dragged, raked, or otherwise worked so as to cover the seed with a layer of

soil. The depth of covering shall be as directed by the Engineer. If two kinds of seed are to be used which require different depths of covering, they shall be sown separately.

When a hydraulic seeder is used for application of seed and fertilizer, the seed shall not remain in water containing fertilizer for more than 30 minutes prior to application unless otherwise permitted by the Engineer.

Immediately after seed has been properly covered, the seedbed shall be compacted in the manner and degree approved by the Engineer.

All seeding shall be maintained, watered, etc. until a permanent vegetated ground cover is established over all disturbed areas.

Mulch shall be applied according to the following:

It shall be spread uniformly at the rate give above and in a continuous blanket over the areas specified.

Before mulch is applied on cut or fill slopes which are 3:1 or flatter, and ditch slopes, the Contractor shall remove and dispose of all exposed stones in excess of 2 inches in diameter and all roots or other debris which will prevent proper contact of the mulch with the soil.

Mulch shall be applied within 24 hours after the completion of the seeding unless otherwise permitted by the Engineer. Care shall be exercised to prevent displacement of soil or seed or other damage to the seeded area during the mulching operations.

Mulch shall be uniformly spread by hand, or by approved mechanical spreaders or blowers that will provide an acceptable application. An acceptable application will be that which will allow some sunlight to penetrate and air to circulate but also partially shade the ground, reduce erosion, and conserve soil moisture.

Mulch shall be held in place by applying a sufficient amount of approved binding material to assure that the mulch will stay in place. The rate and method of application of binding material shall meet the approval of the Engineer. Where the binding material is not applied directly with the mulch, it shall be applied immediately following the mulch operation.

The Contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind, water, or other causes, and shall promptly remove any blockage to drainage facilities that may occur.

Maintain soil erosion control measures until permanent ground cover is established, then remove soil erosion control measures and stabilize these areas.

1.3c Depth Verification and Construction Quality Assurance Requirements

McGill Associates personnel and Madison County Landfill Staff met at the site of the C&DLF Unit 1 on February 19, 2008 to begin the process of identifying waste limits and verifying depth of cover. McGill surveyors staked out the verification grid as shown on Figure 1. A track hoe was utilized to excavate the test hole. Depth of cover to waste was noted on the verification plan. Additionally, excavation around the waste limits was performed at intervals to verify the limits of the waste fill. The results of the verification are shown on Figure 1. Areas that required additional cover materials were noted on the plan. Madison County Landfill Staff utilized the plan when placing the required additional soils. Another site visit was conducted on May 24, 2008 to verify the depth of cover at the areas requiring additional soils. All of the areas met the cover requirements except for 2 small areas that still had insufficient cover. These areas were staked out for landfill staff to place the necessary additional soil. A final site visit to verify depth of cover was conducted on June 24, 2008 and all areas met the soil cover requirements.

Madison County staff used the materials described above for the final cover and the placement of materials was done in accordance with the above detailed Construction Requirements. The project engineer ensures that the materials and methods described above were utilized to construct the final cover system, and that all requirements for cover materials are met.

Chapter 2

On-Site Inventory

2.0 On-Site Waste Inventory

Madison County began operation at the Phase 1 CDLF in 1995. Based on the permit expansion in 2002, there is approximately 39,000 tons of construction/ demolition waste in the CDLF waste area at the time of closure.

Chapter 3
Closure Schedule

3.0 Closure Schedule

3.1 Notification of Division of Solid Waste

The Solid Waste Section was notified on March 31, 2008 of the county's intention to close the CDLF.

Date: March 31, 2008

3.2 Begin Closure

Madison County will begin closure activities of the CDLF Unit 1 no later than 30 days after the date on which the CDLF unit receives the known final receipt of wastes or, if the CDLF unit has remaining capacity and there is a reasonable likelihood that the CDLF unit 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 owner or operator demonstrates that the CDLF unit has the capacity to receive additional wastes and the owner or operator has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the unclosed CDLF unit.

Date of initial survey: February 19, 2008

Placement of soils: March 1, 2008 – June 1, 2008

Date of final survey: June 24, 2008

3.3 Completion of Closure

- a) Madison County will complete closure activities of the CDLF Unit 1, in accordance with the closure plan within 180 days following the beginning of closure. Extensions of the closure period may be granted by the Division if the owner or operator demonstrates that closure will, of necessity, take longer than 180 days and they have taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed CDLF unit.

Date: Summer 2008

3.4 Engineer's Certification

Following closure, Madison County shall notify the Division of Solid Waste that a certification, signed by the project engineer verifying that closure has been completed in accordance with the closure plan, has been placed in the operating record.

Chapter 4 Post Closure Plan

4.0 Post Closure Plan

4.1 Inspections

Inspections of the final cover will be performed according to the table below and the condition of the facility will be recorded with notes, maps, and photographs. Madison County personnel will be on-site to perform inspections on a frequent basis.

The inspection will take notice of:

1. Eroded banks
2. Patches of dead vegetation
3. Animal burrows
4. Subsidence (settlement)
5. Cracks along the cover.
6. Catch basins and stormwater control facilities
7. Ground water monitoring wells

Areas showing subsidence, cracking, signs of erosion or damage are to be repaired.

Schedule of Inspections

Years (Following closure)	Minimum Yearly Inspections
0-2	4
3-30	2

4.2 Maintenance

The vegetative cover will be mowed at least one time a year. In the early stages of development, fertilization will be applied annually as needed.

Seeding of any patches of dead vegetation and proper filling and compaction of any portion of the cap showing subsidence, cracking, or other signs of erosion will be conducted in a timely manner.

Proper repair of any potential erosion problems found to be present during inspection of catch basins, piping, pipe inlets and outlets, and other stormwater control facilities will be conducted in a timely manner.

4.3 Planned Use and Personal Contact

Preliminary proposals for the planned use of the landfill facility, following Closure are inconclusive. No definite plan has been determined as of yet. Most likely, the area will be restricted to landfill maintenance personnel only, thus insuring little or no damage to the final cap system. The person to contact regarding the facility during the Post-Closure period is:

Mr. Jim Huff, Solid Waste Director
Madison County Solid Waste Department
271 Craig Rudisill Road
Marshall, North Carolina 28753
Telephone (828) 649-2311

4.4 Water Quality Monitoring Plan

A Design Hydrogeologic Report for the Construction and Demolition Landfill Unit 1 was performed by Law Engineering, Inc. The facility's existing water quality monitoring system will continued to be followed during the post-closure care period.

4.5 Engineer's Certification

Following completion of the post-closure care period, Madison County shall notify the Division of Solid Waste that a certification, signed by the Project Engineer verifying that post-closure care has been completed in accordance with this post-closure plan, has been placed in the operating record.

**Chapter 5
Post Closure Plan**

5.0 Closure and Post Closure Cost Analysis and Summary

5.1 Estimated Closure Costs (County performing closure activities)

Unit 1 (4.7 ACRES) – Closure

			<u>Unit Cost</u>	<u>Total</u>
Item 1	Earthwork			
	a.	10,000 C.Y. 18" Vegetative cover	\$5.00 /C.Y.	\$50,000.00
	b.	8,000 C.Y. 12" Intermediate Cover	\$4.00 /C.Y.	\$32,000.00
	c.	5,000 C.Y. Misc grading & ditches	\$3.00/C.Y.	\$15,000.00
Item 2	Sedimentation and Erosion Control			
	a.	6.0 AC. Grassing	\$1,200.00 /A.C.	\$7,200.00
	b.	75 Tons Rip Rap	\$50.00 /Tons	\$3,750.00
	c.	300 L.F. Synthetic Lined Channels	\$16.00 /L.R.	\$4,800.00
Item 3	Engineering			
	a.	Design & Permitting and Site Visits		\$4,500.00
Item 4	Contingency (10%)			<u>\$11,000.00</u>
			Total	\$128,250.00

5.2 Post-Closure Costs

Unit 1 (4.7 ACRES) – Estimated Annual Post Closure Care

		<u>Unit Cost</u>	<u>Total</u>
Item 1	Environmental Monitoring		
a.	2 Wells Groundwater Monitoring (2 sampling events/year, includes final report)	\$1,000.00/Well	\$4,000.00
b.	2 Point Surface Water Monitoring (2 sampling events/year, includes final report)	\$1,000.00/Each	\$4,000.00
Item 2	Routine Annual Maintenance		
a.	5 AC. Grassing Mowing (2 cut/year)	\$50.00 /AC.	\$500.00
b.	1 Each Repair of Cap (0.25 acre repair, 1 foot depth)	\$2,500 /Each	\$2,500.00
c.	2 AC. Re-seeding	\$1,200 /AC.	\$2,400.00
Item 3	Annual Permit Fee		\$2,750.00
Item 3	Contingency (10%)		<u>\$1,000.00</u>
		Total Yearly Cost	\$17,150.00



JOB NO.: 08.00700
 DATE: JUNE 2008
 SCALE: 1" = 40'
 DESIGNED BY: DAP
 CADD BY: DAP
 DESIGN REVIEW:
 CONST. REVIEW:

