Permit No.	Date	DIN
97-04	**October 21, 2011**	**15476**

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October 21, 2011
Solid Waste Section
Asheville Regional Office

PREPARED FOR:
WILKES COUNTY DEPARTMENT OF SOLID WASTE
9219 ELKIN HIGHWAY
ROARING RIVER, NORTH CAROLINA 28669

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA
PERMIT No. 97-04

PHASE 4 EXPANSION

VOLUME 2
CONSTRUCTION PLAN APPLICATION
SECTION III – ENGINEERING PLAN
SECTION IV – CONSTRUCTION QUALITY ASSURANCE PLAN
SECTION V – OPERATIONS PLAN
SECTION VI – CLOSURE & POST CLOSURE PLAN

JANUARY 2011

PREPARED BY:

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NORTH CAROLINA CORPORATE LIC: C-0782

NORTH CAROLINA PROFESSIONAL SEAL 035644 ENGINEER STEPHEN J. COWIE 1/27/11

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PHASE 4 EXPANSION

CLOSURE & POST CLOSURE

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VOLUME 2, SECTION VI
CLOSURE AND POST CLOSURE PLAN

TABLE OF CONTENTS

APPENDICES

1.0 CLOSURE ACTIVITIES

Pursuant to the North Carolina Solid Waste Management Rules (15A NCAC 13B .1627), this Closure and Post-Closure Plan is submitted as part of the permit application to construct Phase 4, of the Roaring River Landfill. Phase 1 was constructed in 1993, and began accepting waste the same year. Phase 2 was subsequently constructed and Phase 3 is currently accepting waste. This plan describes proposed closure and post-closure activities for Phase 1-4, site modifications, and site characteristics. Within this Closure and Post-Closure Plan, references are made to information and drawings found in the Facility, Operations, and Engineering Plans to reduce redundancy in this report.

Grading plans, cap sections, and other aspects related to closure, including phased development, stormwater management, and erosion and sediment control, are discussed in the Engineering and Operation Plans of this report, and are illustrated on the drawings. The Construction Quality Assurance (CQA) Plan provided in this application describes methods and procedures to be used in monitoring construction of the closure cap. Detailed drawings, specifications, and other documents will be prepared prior to closure for bidding and construction purposes.

The facility will be closed in accordance with the requirements of EPA's Subtitle D regulations (40 CFR 258.60) and Rule .1627 of the North Carolina Solid Waste Management Rules (15A NCAC 13 B). Given the proposed development plan for the facility, the waste disposal areas will be capped and closed in phases as described in the following paragraphs.

1.1 Closure of Disposal Units

1.1.1 Cap Design

Proposed final grading contours for the facility are provided on Drawing No. FP-04 of the Facility Plan. Final contours have been designed with post-settlement surface slopes of at least five percent on top of the cell. The following components (bottom to top) are proposed as shown on the details:

a. Intermediate Cover and Leveling Course - Local soil will be placed over the daily cover soil to provide at least 12 inches of intermediate cover and a uniform base for construction of the cap.

b. Passive Gas Vents – Passive gas vents will be installed at a frequency of one per acre. A typical passive gas vent is detailed on Drawing No**.** EP-05. Passive venting of landfill gasses will protect the integrity of the cap by preventing excessive pressure buildup beneath the cap.

c. Gas Collection/Migration Layer – A geonet composite will be installed between the intermediate cover and the overlying infiltration layer. The geonet composite will provide a pathway for accumulated gas to move laterally to the gas vents.

d. Infiltration Layer: Clay component: - The infiltration layer is proposed to consist of a geosynthetic clay liner. This layer will be constructed over the geonet composite that will serve as the gas migration layer. Installation and testing requirements for the cap are provided in the Specifications appendix of the Engineering Plan and the CQA Plan.

e. Infiltration Layer: Geomembrane Component - The geomembrane component of the infiltration layer will consist of a textured 40 mil flexible membrane cap (FMC). The membrane will be in direct contact with the underlying layer. The testing program and quality assurance requirements for the geomembrane are described in the CQA Plan.

f. Geocomposite Drainage Layer - A drainage layer consisting of a geonet and geotextile composite will be placed directly over the geomembrane to promote drainage.

g. Protective Layer - A layer consisting of at least 18 inches of local soil will be placed above the drainage layer to provide a protective cover for the underlying cap components. Compaction of the layer will be limited to about 90 percent (plus or minus three percent) of the Standard Proctor maximum dry density so that the vegetation can develop a strong root system, and to avoid damage to the underlying synthetic components.

h. Erosion Layer - A layer of topsoil material or organically amended local soil will be placed above the protective layer. This soil layer will be at least 6 inches in thickness. The topsoil material will be lightly compacted so that a good stand of vegetation can be established. Soil tests will be conducted prior to seeding to determine if soil additives are needed to establish vegetation.

i. Vegetation - After placement of the erosion layer, the area will be seeded. Seeding will be accomplished in accordance with the "North Carolina Erosion and Sediment Control Planning and Design Manual", and recommendations from local agricultural specialists. Mulch and erosion matting will be used as needed to control erosion and promote vegetative growth. The vegetative cover will be inspected regularly. Areas found to be sparsely covered will be revegetated.

1.1.2 Area to Be Capped

The total area requiring a closure cap is 25.4 acres. This is the maximum area that will be open and requiring closure at any one time. Closure can occur in stages. Partial closure can occur when final contours are reached, and the waste appears reasonably stabilized, in a given area. Once an area of sufficient size to make construction cost-effective has reached final elevations, closure activities will be carried out according to the schedule presented later in this section.

1.1.3 Cap Settlement and Stability

Non-uniform settlement can be expected over the entire area that will receive a closure cap. The primary mechanism of settlement is waste consolidation due to decomposition of the landfilled material. According to Daniel, et al, long-term settlement is typically 5 to 15 percent over 20 to 30 years; however, settlement of about 5 percent can be expected in the first few months following waste placement. A significant amount of waste consolidation will likely have occurred by the time each portion of the landfill is closed.

The stability of the proposed cap design under static and seismic conditions has been evaluated and is included in the Engineering Plan. The proposed design was found to be stable at a slope of 3H:1V with a 15' wide stability bench.

After capped portions are completed, monthly inspections of the final cover will be conducted to look for areas of the cap that might have experienced displacement. Should these inspections indicate problem areas, (ponding, exposure of the geomembrane, deep cracks, etc.), repairs will be initiated as soon as practical.

1.1.4 Drainage and Erosion

A combination of drainage ditches, diversion berms, vegetative cover, and sediment traps and basins will control drainage and erosion. Construction and design of sediment and erosion control features will be in accordance with applicable sections of the "North Carolina Erosion and Sediment Control Planning and Design Manual." Drainage will be directed to proposed ditches along the perimeter. These ditches will receive runoff from the cap, conveying the flow to on-site sediment basins. For a detailed discussion regarding stormwater management and erosion and sediment control, please refer to the Erosion and Sediment Control Plan submitted to the Division of Land Quality under separate cover for Phase 3 Expansion.

1.1.5 Freeze/Thaw Effects

Based on a published map of frost depths throughout the United States (EPA, November 1993: A530-R-93-017), the anticipated maximum depth of freeze/thaw effects on the site is less than or equal to 10 inches. Since the upper 18 inches of final cover soil is not the low-permeability component of the cap, the effects of freeze/thaw cycles on the closure cap should not be detrimental to its function.

1.2 Waste Volume

A summary of the total airspace available by phase is provided in Table 2 of the Facility Plan. The available airspace was calculated based on a comparison of the base grade and final grade surfaces.

1.3 Closure Plan Schedule

As discussed in the Facility Plan, Phase 4-6 have a projected operating life of approximately 20 years. Thus, closure of the entire landfill is not anticipated until 2033, assuming waste disposal in Phase 4 begins in 2013. Prior to beginning final closure, Wilkes County will notify the Division that a notice of intent to close the facility has been placed in the operating record. An itemized list of closure milestones and a proposed schedule follow. Closure activities are proposed to begin within 30 days of final receipt of waste. Construction of the closure cap is to be completed within 180 days following the initiation of closure activities. The total length of the proposed closure period is 210 days following the final receipt of waste.

The approximate closure milestones shown in Table 1 below are proposed for use in tracking the progress of closure activities. A detailed schedule will be established prior to construction.

Table 1
Proposed Closure Milestones and Schedule

Milestone	Proposed Schedule from the Date of Final Receipt of Waste
Testing of borrow sources	Within 6 months prior to closure
Grading of intermediate cover	Within 30 to 60 days
Placement of soil cap	30 to 150 days
Final inspection of cap by P.E.	150 to 180 days
Construction of stormwater controls	90 to 180 days
Seeding and mulching	150 to 180 days
Preparation of survey plat	180 to 210 days
Submittal of closure certification	180 to 210 days

1.4 Posting and Baiting

At least one sign will remain posted at the entrance to the facility notifying persons of the facility closing. Also, a notice prohibiting further receipt of waste materials will remain posted at the entrance. The site will be secured through the use of gates equipped with locks, fencing, and/or natural barriers. The site will be baited for rodent and vector control before final closure is initiated.

1.5 Notification

Once closure is complete, a survey plat will be prepared by a registered land surveyor showing the locations and dimensions of the landfill disposal areas, the locations of groundwater

monitoring wells and gas probes, and the restrictions on future disturbance of the site. A notation will be recorded on the property deed stating that the land has been used to dispose solid waste and that its use is restricted under the Closure Plan as required by Rule .1627(c)(8). Copies of the deed notations as recorded will be placed in the Operating Record and forwarded to the Division.

1.6 Certification

Upon completion of closure, a licensed professional engineer acting on behalf of the owner will submit a Certification of Closure to the Division. This Certification will state that the site was closed in accordance with the Closure Plan and applicable solid waste regulations and laws as required by Rule .1627(c)(7).

The owner must record a notation on the deed to the landfill facility property at the local county Registrar of Deeds office, or some other instrument that is normally examined during title search, and notify the division that the notation has been recorded and a copy has been placed in the operating record. The notation shall in perpetuity notify any potential purchaser of the property that the land has been used as a MSW facility and its use is restricted under the closure plan approved by the Division.

1.7 Closure Cost Estimate

An estimate of closure costs is provided in Appendix VI-1. All costs are given in 2010 dollars.

2.0 POST-CLOSURE ACTIVITIES

Post-closure activities will be conducted at the landfill in accordance with Rule .1627 for a period of 30 years following closure of the landfill. The length of the period can be increased or decreased in accordance with Division directives.

2.1 Contact

All correspondence and questions concerning the post-closure care of the unit should be directed to:

Mr. Kent Brandon
Solid Waste Director
Wilkes County Department of Solid Waste
PO Box 389
Roaring River, North Carolina, 28669
336-696-5806

2.2 Security

Access to the site will be controlled by the use of barriers and gates at roadway entrances. These control devices will be maintained throughout the post-closure care period, and inspected as part of the monthly inspection program. All barriers and gates will be clearly marked with signs

stating the name and nature of the facility and the person to contact in case of emergency or breach of security.

2.3 Post-Closure Maintenance

Post-closure maintenance and monitoring will be conducted at the Roaring River Landfill for a period of 30 years after final closure. The Division may decrease the length of the post-closure period if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment, and the Division approves this demonstration. The period might be increased by the Division if the Division determines that the lengthened period is necessary to protect human health and the environment. Monitoring will include semi-annual sampling of groundwater and surface water, quarterly gas monitoring, and monthly inspection of the final cover and monitoring and control systems. Maintenance needs identified through the monitoring program will be initiated no later than 60 days after the discovery, and within 24 hours if a danger or eminent threat to human health or the environment is indicated. Minor cap maintenance may be deferred until there is a sufficient amount of work to justify the mobilization of equipment and personnel. Unusual or extreme maintenance needs due to calamities or vandalism might require the implementation of emergency contract service procedures established by Wilkes County.

2.4 Inspection Plan

Routine inspections will be conducted throughout the post-closure care period. These inspections will be carried out monthly unless problems are detected which indicate more frequent visits. Potential impacts to the public and environment will be considered in determining the inspection frequency. Items to be included in the monthly inspection will be as follows:

- Access and security control
- Leachate management and storage systems
- Stormwater management
- Erosion and sediment control
- Gas management
- Groundwater and landfill gas monitoring systems
- Integrity of site benchmarks
- Integrity of the final cover system
- Vector control

Inspection forms have been prepared for use during each inspection (see Appendix VI-2). Completed copies of the inspection forms will be kept by the owner, and copies will be forwarded to the Division for its records.

2.5 Monitoring Plan

2.5.1 Groundwater Monitoring

Groundwater monitoring will occur semi-annually throughout the post-closure care period. The monitoring schedule will continue as established during the active life of the facility. The applicable procedures outlined in Rules .1633 through .1637 will be followed through post-closure as required by site findings. Refer to the Water Quality Monitoring Plan in Section VII – Water Quality Monitoring Plan of this submittal.

The post-closure care period for the site is 30 years unless modified by the Division. If the statistical analysis of the groundwater monitoring data does not indicate degradation to the quality of the groundwater after the 30-year post-closure care period, a request will be made to terminate the groundwater monitoring program. All groundwater-monitoring wells will be maintained so that future monitoring can be resumed if desired. A blank groundwater monitoring well maintenance record form is provided in Appendix VI-3.

2.5.2 Surface Water Monitoring

Surface water will be monitored according to the Water Quality Monitoring Plan.

2.5.3 Landfill Gas Monitoring

Landfill gas will be monitored quarterly at permanent gas probes and in all on-site structures. A typical landfill gas monitoring probe is shown on Drawing No. EP-05. The monitoring schedule will continue as established during the active life of the facility. Refer to the Operation Plan for details regarding the landfill gas monitoring program. A blank landfill gas monitoring data form is provided in Appendix VI-4.

2.5.4 Stormwater, Erosion, and Sedimentation Control Facilities

Stormwater management features proposed in the Erosion and Sediment Control Plan are designed to function throughout the post-closure care period. Drainage ditches and sediment ponds will be inspected and maintained as needed to control surface water runoff and erosion.

2.5.5 Leachate Management and Closure Plan

Leachate management will continue according to the approved practices at the facility during the post-closure period as long as leachate continues to be generated. The leachate collection system will be checked periodically and maintained to prevent clogging. Tanker trucks will be used as needed to haul leachate to the wastewater treatment plant for disposal.

When leachate collection ceases, the following closure activities will be completed within 180 days: Leachate removal pipes will be securely plugged, and liquid and solid waste will be removed from the storage facilities and associated piping. Contaminated subsoils, structures,

and equipment will also be removed. Material that is removed will be disposed in accordance with applicable requirements.

2.5.6 Record Keeping

The following records will be maintained in the Operating Record at the landfill office or an alternative location near the facility approved by the Division throughout Post Closure Care of the facility and made available to the Division upon request:

- The facility permit and pertinent correspondence;
- Emergency Response Plan;
- Inspection records, repair and maintenance records;
- Historical amounts by weight of solid waste received at the facility, including the source of generation;
- Gas monitoring plan, monitoring results and any remediation plans developed in accordance with Division requirements if required as a response to elevated gas concentrations;
- Water Quality Monitoring Plan and any demonstration, certification, finding, monitoring, testing, or analytical data required by the water quality monitoring program at the site;
- Required cost estimates and financial assurance documentation;
- Closure and Post-Closure Plans; and
- Leachate generation and disposal quantities (including the amount used as dust suppressant)

2.6 Training

Personnel responsible for conducting monitoring activities, site inspections and maintenance will be competent individuals trained in the skills needed for their job. Personnel will continue to receive training as new programs become available.

Groundwater and surface water monitoring will be performed by a qualified firm, and laboratory analysis will be conducted by a certified environmental laboratory.

2.7 Post-Closure Land Use

The primary land use for the site after closure of the landfill will be open dormant green space. Limited passive recreational uses may be proposed at a later time.

2.8 Post-Closure Cost Estimate

An estimate of post-closure care costs is provided in Appendix VI-5. All costs are given in 2010 dollars.

(End)

GROUNDWATER MONITORING WELL MAINTENANCE RECORD

FACILITY: _____ WELL #:

LOCATION: _____ DATE:

INSPECTOR: _____ COMPANY:

1. Is surface water diverted away from the wellhead?

2. Is the concrete pad still intact and free of cracks?

3. Has surface water runoff undercut the concrete pad

4. Is the outer casing still secure and locked?

5. Is the well identification tag present and is it legible?

   5a. Does the well identification tag provide the following information:

   - The well identification number?
   - Drilling contractor name and registration number?
   - Total depth of well?
   - Depth to screen?
   - A warning that the well is not for water supply and that the ground water may contain hazardous materials.

6. Is the grout between the inner and outer well casings all the way to the ground surface?

7. Is the inner casing firmly grouted in place?

8. Are the inner and outer casings upright and unobstructed?

9. Is water collecting in the outer casing? Does a weep hole need to be bored in the outer casing to provide drainage?

10. Is the monitoring well accessible by a four-wheel drive vehicle?

11. Have brush and weeds been trimmed so that the well is easy to locate and access?

12. Does the inner well casing have a vented cap?

13. Is the monitoring well visible and adequately protected from moving equipment?

POST-CLOSURE INSPECTION RECORD

FACILITY: _____ PERMIT NO. _____

LOCATION: _____ DATE: _____

INSPECTOR: _____ COMPANY: _____

---

1. Access and Security Control

- □ Is a notice prohibiting the further disposal of waste materials clearly visible at the entrance to the facility?
- □ Is the site adequately secured by means of gates, chains, berms, fences or other security measures to prevent unauthorized entry?
- □ Are the access roads to and within the site maintained to provide access to the closed disposal area and to all monitoring points?

2. Erosion and Sediment Control

- □ Is the vegetation adequate to stabilize the site and prevent erosion?
- □ Are the erosion control measures adequate to prevent silt from leaving the site and to prevent excessive on-site erosion?
- □ Do the sediment basins require cleaning out, as indicted by the level of sediment buildup?

3. Drainage Control Requirements

- □ Are all areas adequately sloped to promote surface water runoff in a controlled manner?
- □ Are there areas of observed settlement, subsidence, and/or displacement of the closure cap?
- □ Are all drainage channels free of accumulated sediment?

4. Uncontrolled Escape of Leachate or Landfill Gas

- □ Are there any leachate seeps observed?
- □ Are there any signs of uncontrolled releases of landfill gas?

5. Environmental Monitoring Systems

- □ Are all monitoring wells (gas and groundwater) properly maintained? (Note: Complete the Groundwater Monitoring Well Maintenance Record during semi-annual sampling events.)

6. Miscellaneous

- □ Are all site benchmarks marked and evident?
- □ Do vector control measures appear adequate?

7. Final Cover System Inspection

- □ Are there areas of settlement and/or subsidence on the cap system?
- □ Are there areas of erosion or animal burrows on the cap system?

METHANE MONITORING TEST REPORT

Facility:
Location:

Date of Test:

Weather Condition:

Temperature:_____ Barometric Pressure:
Sampling Personnel:

Monitoring Point	Description/Location	Time	Methane Concentration (% of LEL)

APPENDIX VI-1

CLOSURE COST ESTIMATES

Table 1
Estimate of Closure Cost:
Roaring River Landfill
Phase 1-4

ITEM	UNIT	QUANTITY	UNIT COST	COST $
FINAL CAP SYSTEM- 25.4 ACRES (PHASE 1-4)				
Intermediate Cover (12" non-specified)	cy	40,979	$4.00	$163,916
Geonet Composite (Gas Migration Layer)	sf	1,106,424	$0.50	$553,212
GCL	sf	1,106,424	$0.55	$608,533
Geomembrane (40 mil)	sf	1,106,424	$0.50	$553,212
Geonet Composite (Drainage Layer)	sf	1,106,424	$0.50	$553,212
Protective cover (18")	cy	61,469	$5.10	$313,489
Erosion Layer (6")	cy	20,490	$4.00	$81,958
			Subtotal	$2,827,533
SEDIMENTATION AND EROSION CONTROLS				
Diversion Berms				
Construction and lining	lf	5,770	$13.00	$75,010
Slope Drains				
HDPE Pipe and Installation	lf	1,625	$43.12	$70,070
Drainage Bench Inlet	each	14	$300.0	$4,200
Conveyance Channels				
Riprap Channels	lf	0	$57.50	$0
Grass-lined Channels	lf	385	$5.75	$2,214
Drainage Pipe (RCP)	lf	0	$40.00	$0
Miscellaneous				
Outlet Protection (RipRap)	each	3	$440.00	$1,320
Silt Fence	lf	1,000	$3.60	$3,600
			Subtotal	$156,414
GAS CONTROLS (Vents)	each	25	$5,000.00	$127,000
VEGETATIVE COVER	acre	25	$1,750.00	$44,450
TOTAL OF ABOVE ITEMS				$3,155,396
MOBILIZATION / DEMOBILIZATION	(construction only)		5%	$157,770
ENGINEERING FEE	-	-	2%	$63,108
CQA	(cap only)	-	6%	$169,652
CONTINGENCY	-	-	10%	$315,540
ADMINISTRATION	lump sum	-	-	$2,500
CLOSURE CERTIFICATION	lump sum	-	-	$2,500
SURVEY AND DEED	lump sum	-	-	$8,000
TOTAL CLOSURE COST (IN 2010 DOLLARS)				$3,874,466

Notes:
1. Costs are based on conceptual design and should be considered approximate.

APPENDIX VI-2

POST-CLOSURE INSPECTION RECORD

POST-CLOSURE INSPECTION RECORD

FACILITY: _____ PERMIT NO. _____

LOCATION: _____ DATE: _____

INSPECTOR: _____ COMPANY: _____

---

1. Access and Security Control

- ☐ Is a notice prohibiting the further disposal of waste materials clearly visible at the entrance to the facility?
- ☐ Is the site adequately secured by means of gates, chains, berms, fences or other security measures to prevent unauthorized entry?
- ☐ Are the access roads to and within the site maintained to provide access to the closed disposal area and to all monitoring points?

2. Erosion and Sediment Control

- ☐ Is the vegetation adequate to stabilize the site and prevent erosion?
- ☐ Are the erosion control measures adequate to prevent silt from leaving the site and to prevent excessive on-site erosion?
- ☐ Do the sediment basins require cleaning out, as indicted by the level of sediment buildup?

3. Drainage Control Requirements

- ☐ Are all areas adequately sloped to promote surface water runoff in a controlled manner?
- ☐ Are there areas of observed settlement, subsidence, and/or displacement of the closure cap?
- ☐ Are all drainage channels free of accumulated sediment?

4. Uncontrolled Escape of Leachate or Landfill Gas

- ☐ Are there any leachate seeps observed?
- ☐ Are there any signs of uncontrolled releases of landfill gas?

5. Environmental Monitoring Systems

- ☐ Are all monitoring wells (gas and groundwater) properly maintained? (Note: Complete the Groundwater Monitoring Well Maintenance Record during semi-annual sampling events.)

6. Miscellaneous

- ☐ Are all site benchmarks marked and evident?
- ☐ Do vector control measures appear adequate?

7. Final Cover System Inspection

- ☐ Are there areas of settlement and/or subsidence on the cap system?
- ☐ Are there areas of erosion or animal burrows on the cap system?

APPENDIX VI-3

GROUNDWATER MONITORING WELL MAINTENANCE

GROUNDWATER MONITORING WELL MAINTENANCE RECORD

FACILITY: _____ WELL #:

LOCATION: _____ DATE:

INSPECTOR: _____ COMPANY:

1. Is surface water diverted away from the wellhead?
2. Is the concrete pad still intact and free of cracks?
3. Has surface water runoff undercut the concrete pad
4. Is the outer casing still secure and locked?
5. Is the well identification tag present and is it legible?

   5a. Does the well identification tag provide the following information:

   - The well identification number?
   - Drilling contractor name and registration number?
   - Total depth of well?
   - Depth to screen?
   - A warning that the well is not for water supply and that the ground water may contain hazardous materials.

6. Is the grout between the inner and outer well casings all the way to the ground surface?
7. Is the inner casing firmly grouted in place?
8. Are the inner and outer casings upright and unobstructed?
9. Is water collecting in the outer casing? Does a weep hole need to be bored in the outer casing to provide drainage?
10. Is the monitoring well accessible by a four-wheel drive vehicle?
11. Have brush and weeds been trimmed so that the well is easy to locate and access?
12. Does the inner well casing have a vented cap?
13. Is the monitoring well visible and adequately protected from moving equipment?

APPENDIX VI-4

LANDFILL GAS MONITORING DATA FORM

Landfill Gas Monitoring Data Form

Facility Name:
Date of Sampling:
Gas Monitor Type & Serial Number:
Field Calibration Date & Time:
General Weather Conditions:

Permit Number:
Personnel:
Calibration Date:
Calibration Gas Type:
Barometer :

Location or LFG Well ID	Instr. purged	Time	Probe Pressure (InWg)	Time Pumped (sec.)	CH_4 (%LEL)	CH_4 (%Vol)	Notes

Abbreviations: BP= Barhole Probe
LEL= Lower Explosive Limit

APPENDIX VI-5

POST-CLOSURE COST ESTIMATE

Table 2
Estimate of Post-Closure Care Costs:
Roaring River Landfill
Phase 1-4

ITEM	UNIT	QUANTITY	UNIT COST	ANNUAL COST
INSPECTIONS/ RECORD KEEPING	per trip	4	$500	**$2,000**
MONITORING				
Explosive gases (quarterly)	per trip	4	$0	$0
Groundwater/Surfacewater (semi-annually)				
Sampling	per trip	2	$0	$0
Analysis	per trip	2	$0	$0
Reporting	per trip	2	$0	$0
Surface Water (semi-annually)	per trip	2	$0	$0
Leachate sampling and analysis	per trip	2	$0	$0
Subtotal				**$0**
ROUTINE MAINTENANCE				
Mowing	acre	25.4	$150	$3,810
Fertilizing (once every 3 years)	acre	8.5	$255	$2,159
Reseeding (once every 3 years)	acre	8.5	$1,600	$13,547
Vector and Rodent Control	acre	25.4	$30	$762
Subtotal				**$20,278**
WELL MAINTENANCE				
Groundwater Wells	lump sum	1	$0	$0
Gas Detection Probes	lump sum	1	$0	$0
Subtotal				**$0**
CAP REPAIR	lump sum	1	$6,000	**$6,000**
TOTAL OF ABOVE ITEMS				**$28,278**
ENGINEERING	-	-	3%	$848
CONTINGENCY	-	-	5%	$1,414
TOTAL ANNUAL POST-CLOSURE COST (IN 2010 DOLLARS)				**$30,540**
TOTAL 30 YEAR POST-CLOSURE COST (IN 2010 DOLLARS) ***An additional $3,000,000 is required for Corrective Action**				**$602,083**

Notes:

1. All costs include labor by a third party.
2. Water quality monitoring and leachate management costs are estimated.
3. Cost for groundwater wells assumes maintenance of each well during the period.
4. Cost for the gas probes assumes maintenance of each probe during the period.