CCR Compliance Supplement: Closure and Post-Closure Plan

Brickhaven No.2 Mine Tract “A” Structural Fill

Charah, Inc.

Moncure, NC

July 2015

NOTE:
This plan is intended to replace the Closure and Post-Closure Plan provided in the Brickhaven No.2 Mine Tract “A” Structural Fill Permit Application approved June 5, 2015.

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Appendix

NOTE: References to North Carolina General Statues contained in the Brickhaven No. 2 Mine Tract "A" Structural Fill Permit Application and this replacement Closure and Post Closure Plan were based on Senate Bill 729 which became session law on September 20, 2014. These references differ from the official published version of the law which added seven sections reserved for future codification purposes (§§ 208, 209, 216, 217, 227, 228, and 229).

1 Introduction

The purpose of the Closure/Post-Closure Plan is to outline the steps for the Operator to follow during closing of the structural fill as well as the maintenance activities needed during the post closure period. Closure is designed to minimize the need for long term maintenance and to control the post-closure release of contaminants. The proposed closure plan should be re-evaluated by a registered professional engineer prior to closure activities. Closure activities may be revised as appropriate for materials, specifications, technological advances or changes in regulations at that time. Any revisions shall be submitted to the department and approved prior to implementation. The proposed top of coal combustion products (CCP) contours for the structural fill are shown on Sheet 01C-04, Reclamation Plan, contained in the facility permit application.

Phasing of the structural fill development is designed so that final cover can be established as soon as possible. The final cover will be constructed in stages as cells of the structural fill reach final grade. The final structural fill contours will have erosion control benches and side slopes at a maximum 4H:1V. The top of the structural fill is designed for a minimum two percent slope.

Prior to beginning closure of each structural fill cell, the Operator shall notify NCDENR that a notice of intent to close the structural fill cell has been placed in the operating record. The notice of intent will include a certification by a qualified processional engineer that the design of the final cover system meets the requirements of the section as required by §257.102(d) (3)(iii).

Closure activities for the structural fill cell shall begin no later than 30 days after the date on which the structural fill unit receives the known final receipt of CCP or within 2 years of the last receipt of CCP (if the structural fill is not full). Closure construction is anticipated to take up to a year to complete after commencement of the final phase of closure at the unit. A demonstration for a time extension will be placed in the operating record if closure construction is estimated to take longer than six months in accordance with the Coal Combustion Residual (CCR) Rules.

Certification that the final cover system was constructed in accordance with the closure plan requirements of the CCR rule by a qualified professional engineer is required.

Following closure operations, the facility may be developed.

If the structural fill must be closed prior to reaching the final contours, the surface of the structural fill will be sloped to a minimum grade of two percent and maximum grade of 4H:1V. A final cover will be established over the structural fill cell being closed.

Minimal settlement and subsidence of the structural fill is anticipated due to the material properties of the CCP and the method in which the CCP is placed in the structural fill. Any settlement or subsidence that disrupts the final cover system will be immediately repaired.

2 Closure Plan

A Closure Plan is required by North Carolina General Statute (NCGS) §130A-309.218 (b) (1) to be submitted to the North Carolina Department of Environment and Natural Resources

(NCDENR) for large structural fill projects. Large Structural Fill Projects are defined in NCGS §130A-309.218 (b) as involving placement of 8,000 or more tons of CCP per acre or 80,000 or more tons of CCP in total per project. NCGS §130A-309.218 (b) (1) requires a closure plan to describe the cap system and the methods and procedures used to install the cap system; provide an estimate of the largest area of the structural fill that will require a cap system; provide an estimate of the maximum inventory of CCP onsite; and provide a schedule for completing closure. CCR Rule §257.102(b)(1)(i) also requires that the closure plan contain a narrative description of how the structural fill will be closed in accordance with §257.102. In addition, NCGS §130A-309.219 requires specific recordation once closure is complete.

A certified copy of this closure plan will be placed in the facility's operating record in accordance with CCR Rule §257.102(b)(2)(iii).

CCR Rule §257.102(b)(3) will be followed if there are any amendments to the closure plan. The closure plan must be amended whenever there is a change in the operation of the structural fill that would substantially affect the written closure plan in effect or if unanticipated events necessitate a revision of the written closure plan.

2.1 Cap System Description

NCGS §130A-309.218 (b) (1) a. requires the Closure Plan describe the cap liner system and the methods and procedures that will be used to install the cap in conformance with NCGS § 130A-309.216 (b). The cap will be built in accordance with NCGS §130A-309.216 (b) (3), minimizing infiltration and erosion. The purpose of the final cap system is to control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids in the CCP and releases of CCP, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere.

There are two proposed cap systems for the structural fill. A decision on which cap system to use will be made before closure begins and will be based on cost, soil availability and other factors. One proposed cap system consists of (from top down to CCP): topsoil, a low permeable soil layer, an unclassified soil layer, a drainage soil layer and a geomembrane. The other proposed cap system consists of (from top down to CCP): topsoil, a low permeable soil layer (on the top of the structural fill only), an unclassified soil layer, a geocomposite drainage layer, and a geomembrane. The thickness of some of the layers will vary depending on the location of the cap on the structural fill. The top of the structural fill will have a six foot cap and the side slopes of the structural fill will have a four foot cap as shown in Table 1.

Table 1 Cap System Thickness

	Soil/Geomembrane Cap		**Soil/Geocomposite Drainage Layer/Geomembrane Cap**	
Layer	**Top**	**Side Slope**	**Top**	**Side Slope**
Topsoil thickness	6 inches	6 inches	6 inches	6 inches
Low permeable soil layer thickness	12 inches	12 inches	12 inches	NA
Unclassified soil layer thickness	42 inches	18 inches	54 inches	42 inches
Drainage soil layer thickness	12 inches	12 inches	NA	NA
Geocomposite drainage layer	NA	NA	250 mil	250 mil
PE geomembrane	40 mil	40 mil	40 mil	40 mil
Total Cap Thickness[a]	**6 feet**	**4 feet**	**6 feet**	**4 feet**

[a] Ignores the nominal thickness of the geocomposite drainage layer and the PE geomembrane.

The topsoil layer will be capable of sustaining native plant growth and will help to minimize the erosion of the final cover system. The low permeable soil layer and unclassified soil layer serve to minimize infiltration of liquids through the structural fill.

The Operator will prepare the supporting CCP surface or interim cover for the closure cap. Vegetation shall be removed and the interim cover soil shall be scarified or removed prior to placing any overlying material. The surface to be covered with geomembrane will be rolled and compacted so as to be free of irregularities, protrusions, loose materials, and abrupt changes in grade. Prior to geomembrane placement, perimeter anchor trenches will be excavated. The geomembrane panels will be placed one at a time and field seamed.

Soil materials will be placed directly on top of a geomembrane or geocomposite in such a manner as to ensure there is no damage to the geomembrane or geocomposite. Typically, a minimum thickness of one foot of soil is specified between a low ground-pressure dozer and the geomembrane or geocomposite. The soils must be free of objects that could cause damage to the geomembrane or geocomposite.

Soil materials will be placed in six-inch compacted lifts with equipment only operating over previously placed soil material. The lifts will be placed with sufficient number of passes to achieve 90% compaction (Standard Proctor) and compacted by tracking using low-ground pressure construction equipment meeting the requirements of the project specifications. The topsoil will be a six-inch thick layer of soil capable of promoting the growth of vegetation. The total thickness of the final cover shall be at least six feet on the top of the structural fill and at least four feet on the side slopes of the structural fill.

2.1.1 Performance Standards

The closure plan is required by CCR Rule §257.102(b)(1)(iii) to discuss how the final cover system will achieve the performance standards specified in paragraph (d) of CCR Rule §257.102. The performance standards are described either in this Closure and Post-Closure Plan, the Engineering Plan, the Facility Plan or elsewhere in the Structural Fill Permit Application.

CCR Rule §257.102(d)(3)(i)(A) requires that the final cover system to have a permeability less than or equal to the permeability of the bottom liner system, or natural subsoils present, or a permeability no greater than 1 x 10^{-5} cm/sec, whichever is less. The least permeable layer in the base liner system is the geomembrane and the final cover system includes a geomembrane. Therefore the cover system is deemed to be equivalent to the base liner system without the need for further modeling. This is consistent with NCDENR's position related to Subtitle D final cover systems..

2.2 Surface Water Run-on and Run-off

Surface water running off the structural fill during and after a rainfall event will be collected and routed off the cover by erosion control benches and slope drains. Surface water that flows

toward the structural fill from uphill areas (run-on) will be intercepted and channeled away from the structural fill and final cover surface by diversion channels and perimeter berms.

2.3 Erosion Control

Erosion will be controlled by vegetation, erosion control benches and diversion of run-off. Vegetation will aid in reducing soil erosion. Benches break the velocity of sheet flow over the closed structural fill, control development of erosion features before they damage the final cover, and divert runoff into manageable flow volumes. Sediment laden runoff will be collected in the sediment basins.

2.4 Dust Control

Dust control during closure construction will be managed as outlined in the Operations Plan in the Brickhaven No.2 Mine Tract "A" Structural Fill Permit Application as well as the Operating Criteria dust control plan included in this supplement.

2.5 Estimate of Largest Area to Require Closure

NCGS §130A-309.218 (b) (1) b. requires the Closure Plan to provide an estimate of the largest area of the structural fill project that will require a cap at any time during the overall construction period. The largest area requiring closure at any time will be 34.8 acres.

2.6 Estimate of Maximum Inventory of Coal Combustion Products

NCGS §130A-309.218 (b) (1) c. requires the Closure Plan to provide an estimate of the maximum inventory of CCP ever onsite over the construction duration of the structural fill. The structural fill is sized to hold an estimated total of approximately 9.2 million cubic yards of CCPs in five cells.

2.7 Closure Schedule

Closure is anticipated to be undertaken in three phases as the unit is filled to final grades. Final closure activities for the structural fill cell shall begin no later than 30 days after the date on which the structural fill unit receives the known final receipt of CCP or within 2 years of the last receipt of CCP (if the structural fill is not full). Closure construction is anticipated to take up to a year to complete after commencement of the final phase of closure at the unit. A demonstration for a time extension will be placed in the operating record if closure construction is estimated to take longer than six months in accordance with the CCR Rules. Based on a landfill opening date of 2015, the three closure phases are anticipated to occur in 2018, 2020 and 2021. In accordance with CCR Rule §257.102(d)(1)(v), closure will be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices. A listing of key closure activities can be found in Figure 1.

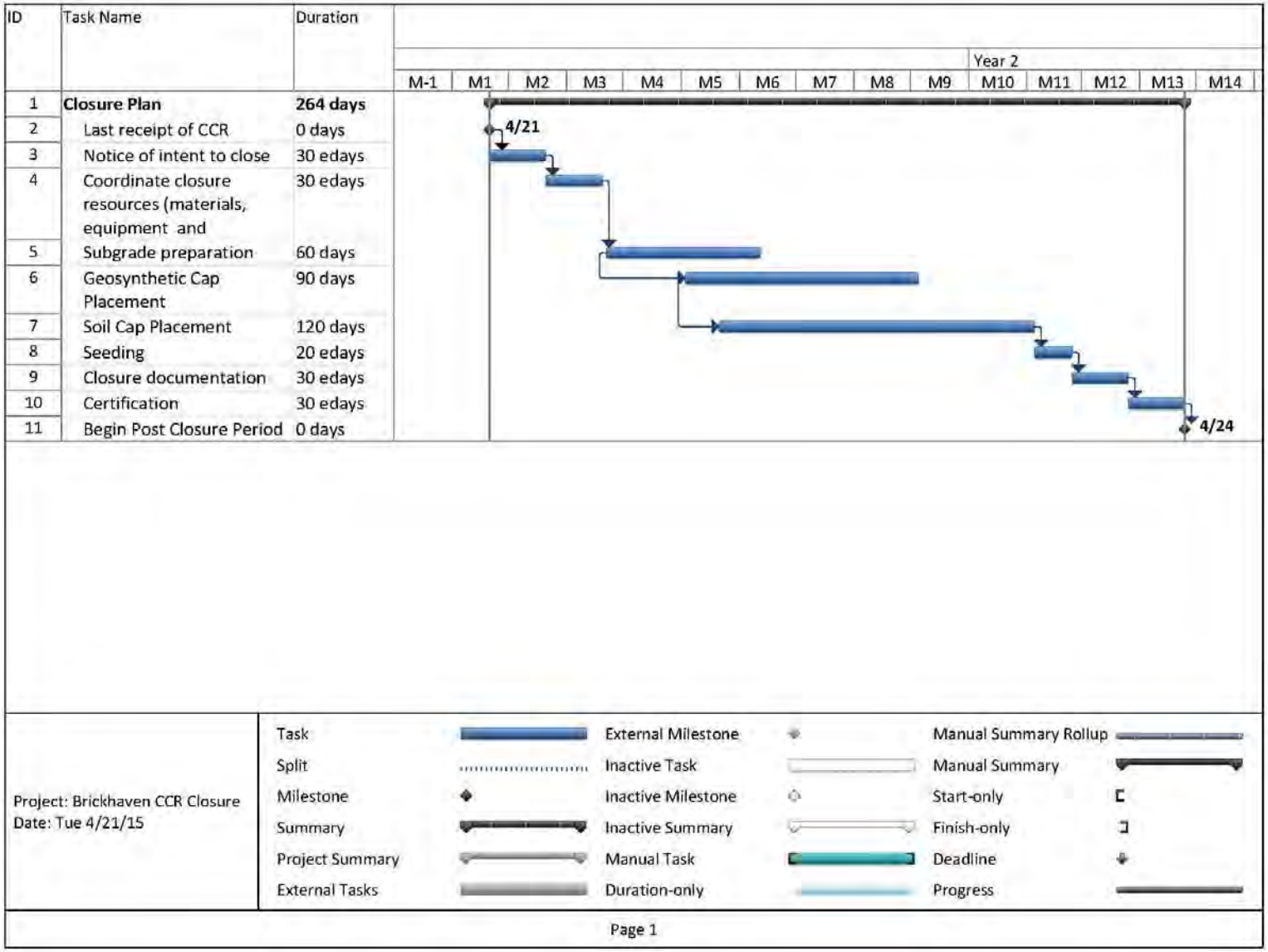

Figure 1 Proposed Closure Activities

2.8 Closure Cost Estimate

The cost to complete closure is calculated on a per acre basis. The final cap thickness varies between the top (i.e., flatter slope) and the side slopes (i.e., 4H:1V slope). In addition, both of the cap cross-sections have the option to be constructed with or without a geocomposite. The calculations included in Appendix A of this section cover each of the possible options. The cost estimates include, as warranted, the items listed below.

- Mobilization, Administration & Bonds
- Surveying & Control
- Topsoil Layer
- Low Permeable Soil Layer
- Unclassified Soil Layer
- Lateral Drainage Soil Layer (depending on option)
- Geocomposite Drainage Layer (depending on option)
- Geomembrane (40 mil double sided textured polyethylene)
- Seeding/Fertilizing/Mulching
- Contingency
- Engineering - Plans & Specs
- CQA & Certification
- Construction Management

The pricing for soils assumes sufficient quantity and quality material is onsite. The average closure cost for the structural fill ranges from $104,500 (side slopes) to $132,900 (top) per acre for the soil and geomembrane cap and from $143,100 (side slopes) to $172,200 (top) per acre for the soil, geocomposite drainage layer, and geomembrane cap. Selection of the closure cap option will depend on the availability and pricing of materials at the time of closure. The cost estimate will be updated annually.

2.9 Certification & Notification

A certification signed and sealed by a registered professional engineer will be submitted to NCDENR within 30 days of the completion of the closure cap system or any partial closure of the cap system construction. The certification will verify that the closure has been completed in accordance with the closure plan and the CCR Rule. Within 30 days of the completion of closure, the Operator will prepare a notification of closure of the structural fill which will include the certification and will place it in the operating record.

2.10 Recordation

NCGS §130A-309.219 requires recordation of the structural fill project (with more than 1,000 cubic yards of CCP) with the Register of Deeds. The notation on the deed will in perpetuity notify any potential purchaser that the land has been used as a CCR unit and that it's use is restricted under the post-closure care requirements in the post-closure plan and CCR Rule §257.104. The recordation will include a statement with the volume and location of the coal combustion residuals and will identify the parcel of land where the structural fill is located. The statement will be signed and acknowledged by the landowners in the form prescribed by NCGS

47-38 through NCGS 47-43. NCGS §130A-309.219 will be consulted for all the information required in the statement and the format of the statement prior to the creation of the statement. In accordance with NCGS §130A-309.219 (b) the statement will be submitted to the Register of Deeds within 90 days after completion of the structural fill project using coal combustion residuals. NCDENR will be notified by the Operator of the closure completion, certification by a professional engineer that closure was completed in accordance with the Closure/Post-Closure Plan, and within 30 days of recording a notation on the deed to the property, the Operator will prepare a notification stating that the notation has been recorded. This notification will be placed in the structural fill's operating record.

3 Post-Closure Plan

A Post-Closure Plan is required by NCGS §130A-309.218 (b) (2) to be submitted for large structural fill projects. NCGS §130A-309.218 (b) (2) requires a post-closure plan to describe the monitoring and maintenance activities required for the structural fill project; provide contact information for a person or office responsible for the structural fill project during the post-closure period; describe the planned uses of the property during the post-closure period; and provide a cost estimate for the post-closure period activities.

A certified copy of this post-closure plan will be placed in the facility's operating record as required by CCR Rule § 257.105(i)(4).

This post-closure plan will be reevaluated prior to the beginning of post-closure care activities in order to ensure that the post-closure plan meets the necessary requirements. CCR Rule §257.104(d)(3) will be followed if there are any amendments to the post-closure plan. The post-closure plan must be amended whenever there is a change in the operation of the structural fill that would substantially affect the written post-closure plan in effect or if after post-closure activities have commenced unanticipated events necessitate a revision of the written post-closure plan.

Large structural fill projects are required by NCGS §130A-309.218 (b) to perform post-closure care. In accordance with NCGS §130A-309.218 (b), the post-closure care will be conducted for 30 years. If the structural fill project is operating under assessment monitoring, then the structural fill will continue post-closure care until the structural fill returns to detection monitoring.

Post-closure care of the facility after closure will consist of the following elements:

- Inspection and maintenance of final cap systems, including
    - Repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events
    - Preventing run-on and run-off from eroding and damaging the cap system (see Sections 2.2 and 2.3 of this Closure/Post-Closure Plan)
- Operation, inspection and maintenance of the leachate collection system.
- Control of access with fences and/or signs.

The final cover system will be inspected quarterly for signs of settlement, erosion, and bare spots. Additional inspections will be performed after large storm events. Depressions in the cover that pond water or otherwise impair the function of the final cover will be filled and/or regraded. Areas subject to regrading will be revegetated. Erosion damage will be repaired, and the source of the damage will be corrected, if possible. The grass will be mowed at least twice annually. Bare spots will be revegetated with grass seed. Any deep-rooted or woody vegetation that may have established itself on the cover soil will be removed so that deep root growth will not compromise the integrity of the geosynthetics of the final cover.

The leachate collection system shall be inspected on a quarterly basis. The pipeline, manholes, pumps, and the leachate storage system will be inspected and maintained as needed.

Following completion of the post-closure care period of the structural fill, the Operator will submit NCDENR a certification, signed by a registered professional engineer, verifying that post-closure care has been completed in accordance with the post-closure plan and will place the certification in the operating record.

3.1 Post-Closure Monitoring and Maintenance Requirements

In accordance with NCGS §130A-309.218 (b) (2) a., a summary of the monitoring and maintenance activities required is listed in Table 2.

Table 2 Post-Closure Monitoring & Maintenance Activities and Their Frequencies

Activity	Frequency
General site inspection Cap system Stormwater management system Utilities Leachate collection system Other miscellaneous Inspections	Quarterly[a]
Mowing	at least twice per year or as needed
Water quality monitoring	per Water Quality Monitoring Plan and the supplemental Groundwater Monitoring Plan
Groundwater monitoring system inspection	Semiannually

[a] The cap system and stormwater management system will be inspected within seven days of a major storm event.

A description of the monitoring and maintenance activities follows.

3.2 General Site Inspection & Maintenance

A general site inspection will occur quarterly. This inspection will include a cap system inspection, a stormwater management system inspection, utilities inspection, a leachate collection system inspection, and other miscellaneous inspections. In addition to inspections, general maintenance will be performed. This general maintenance includes maintaining the vegetation onsite, removing woody waste, and mowing at least twice per year or as needed. The quarterly site inspection has been allocated $5,000 per inspection; actual costs may vary. A checklist for quarterly inspection tasks is provided in Appendix B. These and other inspection

records must be maintained in a central location and made available for any NCDENR inspections.

3.2.1 Cap System Inspection & Maintenance

In accordance with NCGS §130A-309.218 (b) (3) the integrity and effectiveness of the cap system will be maintained. This will include repairing the system as necessary to correct the defects of settlement, subsidence, erosion, or other events and preventing run-on and runoff from eroding or otherwise damaging the cap system (NCGS §130A-309.218 (b) (3)). The cap system will be inspected quarterly or within seven days of a major storm event, whichever is more frequent. The cap system will be inspected for evidence of settlement, subsidence, erosion, and other damage or potential damage.

Cap maintenance will be performed as necessary to maintain the integrity and effectiveness of the cap system. To account for erosion control and cover maintenance in the post-closure period, some reconstruction of the cap (including grassing and soil fill material) has been considered. An annual average cap maintenance of two acres per year of regrassing, and 500 CY of top soil replacement and 500 CY of protective cover replacement per year have been estimated.

3.2.2 Stormwater Management System Inspection & Maintenance

The stormwater management system (sediment basins, perimeter channels, etc.) will be inspected at least quarterly or within seven days of a major storm event, whichever is more frequent, to ensure the system is functioning properly. The current Erosion & Sediment Control Plan may require more frequent inspections and should be followed. Maintenance will be performed as necessary. A lump sum amount of $2,000 has been allocated for annual stormwater management system maintenance and a lump sum amount of $1,200 has been allocated for each stormwater monitoring event. Two stormwater monitoring events have been allocated each year for an annual total of $2,400 for stormwater monitoring; actual costs may vary.

3.2.3 Utilities

Some utilities at the site will be maintained in operational condition during the post-closure period and will be inspected quarterly. The estimated power requirement is $500 a month which is equal to $6,000 a year; actual costs may vary.

3.2.4 Leachate Collection System Operation, Inspection & Maintenance

The leachate collection system will continue to operate and the integrity and effectiveness of the leachate collection and removal system will be maintained during the post-closure care period in accordance with CCR Rule §257.70. The parts of the leachate collection system that are above ground or easily accessible will be inspected quarterly. This will include inspections of the pipelines, manholes, pumps, and the leachate storage system. Maintenance will be performed as necessary in order to ensure the leachate collection system is functioning properly.

Leachate disposal has been measured using the HELP Model to estimate the average quantity of leachate requiring offsite treatment and disposal. The 30-year average during the post-closure period is approximately 80 gallons per acre per year. For the 145 acre footprint (based

on the construction baseline), the average annual volume of leachate is 11,600 gallons. The annual post-closure leachate treatment cost is estimated to be $0.0235 per gallon for an annual leachate treatment amount of $300; actual costs may vary. In addition, a lump sum leachate system maintenance cost has been assumed to be $2,500 per year.

The owner may request from the Department to stop managing leachate from the project if the owner can demonstrate that leachate from the project through a post closure care leachate monitoring program no longer poses a threat to human health and the environment (NCGS §130A-309.218 (b) (4)). If the owner is allowed to stop managing leachate from the project, the owner will stop operating the leachate collection system and may dismantle portions of the leachate collection system that are not under the structural fill project. The leachate collection system inspection and maintenance frequency will be revised if the structural fill is no longer required to operate the leachate collection system.

3.2.5 Other Miscellaneous Inspection & General Maintenance

Any security control devices such as fences and gates located at the site will be inspected quarterly. Repairs will be made as necessary to ensure the security of the structural fill project. A lump sum amount of $500 is assumed as cost associated with fence repairs and other security management; actual costs may vary.

3.3 Mowing

Vegetation on the cap system will be maintained. Mowing will occur at least twice per year or as needed. The unit cost of mowing is assumed to be $24.00 per acre; actual cost may vary. Therefore two events at $24.00/acre x 145 acres = $7,000 per year (or $3,480 per event).

3.4 Water Quality Monitoring, System Inspection & Maintenance

Monitoring of groundwater and surface water is expected to continue during the post closure period in accordance with the Water Quality Monitoring Plan (WQMP) found in the Brickhaven No. 2 Mine Tract "A" Structural Fill Permit Application and the supplemental Groundwater Monitoring Plan (GWMP) found in Appendix IV of the CCR Compliance Supplement. The groundwater monitoring system as defined in the GWMP was designed in accordance with NCGS §130A-309.216 and CCR Rule §257.91 and will be monitored and maintained in accordance with NCGS § 130A-309.218 (b) (5). The supplemental GWMP was created to address the CCR rule by adding additional wells at the CCP boundary.

The groundwater monitoring system will be inspected at least semiannually, during the groundwater monitoring events. A checklist for semiannual inspections is provided in Appendix B of this Closure and Post-Closure Plan. Groundwater monitoring system inspections will include inspecting the groundwater monitoring wells, covers, and pads for damage. Based on the results of the inspections, repairs and maintenance of the system will be performed as necessary.

The estimated cost for implementing, maintenance and repair of the monitoring system is based on the twenty-three groundwater monitoring wells and two surface water sampling locations that require semi-annual sampling and reporting per the WQMP and supplemental GWMP. The

budgeted cost per semiannual monitoring event is estimated to be $23,000. The annual groundwater monitoring well maintenance budget is estimated to average $2,300 per year though actual cost may vary from year to year.

3.5 Administrative Costs

Professional engineering services expected during the post-closure period include investigations of documented problems from the inspection reports. An annual cost of $2,000 per year has been estimated to cover miscellaneous administrative costs; actual costs may vary.

3.6 Contact Person Information

In accordance with NCGS §130A-309.218 (b) (2) b, the name, address, and telephone number of the person or office responsible for the project during the post-closure period is listed below.

Charles E. Price
cprice@charah.com
12601 Plantside Drive
Louisville, KY 40299
(877) 314.7724

3.7 Proposed Post-Closure Use of the Property

NCGS §130A-309.218 (b) (2) c. requires that a description of the planned uses of the property during the post-closure period be included in the post-closure plan. The property will be actively marketed as an industrial use site for development through the local and state economic development commission as well as other real estate advertisement methods. In accordance with NCGS §130A-309.218 (b) (2) c., any post-closure use of the property will not disturb the integrity of the cap system, base liner system, or any other components of the containment system or the function of the monitoring systems, unless necessary to comply with the requirements of this subsection. NCDENR will be consulted prior to any disturbance of the structural fill project and/or its containment system. Prior to any disturbance, the Operator will demonstrate that disturbance of the cap system, base liner system, or other component of the containment system, including removal of CCR will not increase the potential threat to public health, safety, and welfare; the environment; and natural resources. The demonstration will be certified by a qualified professional engineer and notification will be provided to NCDENR that the demonstration has been placed in the operating record and on the publicly accessible internet site.

3.8 Post-Closure Cost Estimate

Reference Appendix A in this section for the annual cost estimate for the post-closure activities in accordance with NCGS §130A-309.218 (b) (2) d.

3.9 Post-Closure Care Completion Certification

No later than 60 days following the completion of the post-closure care period, the Operator will prepare a notification verifying that post-closure care has been completed. In accordance with

NCGS §130A-309.218 (c), "following completion of the post-closure care period, [the Operator will] submit a certification, signed by a registered professional engineer, to [NCDENR], verifying that post-closure care has been completed in accordance with the post-closure plan, and include the certification in the operating record." In addition, the certification will verify that post-closure care has been completed in accordance with the requirements of CCR Rule §257.104.

4 Recordkeeping, Notification, & Internet Requirements

The Operator will comply with the recordkeeping, notification, and internet requirements specified in CCR Rules §257.105 (i), §257.106 (i), §257.107 (i), respectively.

A

Closure/Post-Closure Cost Estimates

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Closure Cost Estimate – Soil /Geomembrane Cap

The following is an estimate of closure costs; actual costs may vary.

				Soil/Geomembrane Cap					
				Top			Sideslope		
Item	Description	Unit Price	Unit	Thickness (in)	Quantity	Total	Thickness (in)	Quantity	Total
1	Mobilization, Administration & Bonds	4%	of Items 2-9		4%	$ 4,000		4%	$ 3,200
2	Surveying & Control	$ 1,600	Acres		1	$ 1,600		1	$ 1,600
3	Topsoil Layer	$ 11.60	CY	6	900	$ 10,400	6	900	$ 10,400
4	Low Permeable Soil Layer*	$ 6.70	CY	12	1,700	$ 11,400	12	1,700	$ 11,400
5	Unclassified Soil Layer*	$ 6.70	CY	42	5,700	$ 38,200	18	2,500	$ 16,800
6	Drainage Soil Layer*	$ 6.70	CY	12	1,700	$ 11,400	12	1,700	$ 11,400
7	Geocomposite Drainage Layer	$ 0.70	SF		0	$ -		0	$ -
8	Geomembrane (40 mil double sided textured PE)	$ 0.60	SF		43,560	$ 26,100		43,560	$ 26,100
9	Seeding/Fertilizing/Mulching	$ 1,500	Acre		1	$ 1,500		1	$ 1,500
10	Contingency	10%	of Items 1-9		10%	$ 10,500		10%	$ 8,200
11	Engineering - Plans & Specs	6%	of Items 1-9		6%	$ 6,300		6%	$ 4,900
12	CQA & Certification	6%	of Items 1-9		6%	$ 6,300		6%	$ 4,900
13	Construction Management	5%	of Items 1-9		5%	$ 5,200		5%	$ 4,100
					Cost Per Acre	$ 132,900		Cost Per Acre	$ 104,500

*The permeabilities for the soil layers may be different; however, the costs have been assumed to be the same with the exception of the topsoil.

Closure Cost Estimate – Soil /Geocomposite Drainage Layer/Geomembrane Cap

The following is an estimate of closure costs; actual costs may vary.

				Soil/Geocomposite Drainage Layer/Geomembrane Cap					
				Top			Sideslope		
Item	Description	Unit Price	Unit	Thickness (in)	Quantity	Total	Thickness (in)	Quantity	Total
1	Mobilization, Administration & Bonds	4%	of Items 2-9		4%	$ 5,200		4%	$ 4,300
2	Surveying & Control	$ 1,600	Acres		1	$ 1,600		1	$ 1,600
3	Topsoil Layer	$ 11.60	CY	6	900	$ 10,400	6	900	$ 10,400
4	Low Permeable Soil Layer*	$ 6.70	CY	12	1,700	$ 11,400		0	$ -
5	Unclassified Soil Layer*	$ 6.70	CY	54	7,300	$ 48,900	42	5,700	$ 38,200
6	Drainage Soil Layer*	$ 6.70	CY		0	$ -		0	$ -
7	Geocomposite Drainage Layer	$ 0.70	SF		43,560	$ 30,500		43,560	$ 30,500
8	Geomembrane (40 mil double sided textured PE)	$ 0.60	SF		43,560	$ 26,100		43,560	$ 26,100
9	Seeding/Fertilizing/Mulching	$ 1,500	Acre		1	$ 1,500		1	$ 1,500
10	Contingency	10%	of Items 1-9		10%	$ 13,600		10%	$ 11,300
11	Engineering - Plans & Specs	6%	of Items 1-9		6%	$ 8,100		6%	$ 6,800
12	CQA & Certification	6%	of Items 1-9		6%	$ 8,100		6%	$ 6,800
13	Construction Management	5%	of Items 1-9		5%	$ 6,800		5%	$ 5,600
					Cost Per Acre	$ 172,200		Cost Per Acre	$ 143,100

*The permeabilities for the soil layers may be different; however, the costs have been assumed to be the same with the exception of the topsoil.

Annual Post-Closure Care Cost Estimate

The following is an estimate of post-closure costs; actual costs may vary.

Item	Description	Quantity	Unit	Unit Price	Total
1	Quarterly Site Inspections	4	Events	$5,000	$20,000
2	Cap System Maintenance				
	a. Seeding/Fertilizing/Mulching	2	acres	$1,500	$3,000
	b. Topsoil Replacement	500	CY	$11.60	$5,800
	c. Protective Cover Replacement	500	CY	$6.70	$3,400
3	Stormwater Management	1	LS	$2,000	$2,000
4	Stormwater Monitoring	2	Events	$1,200	$2,400
5	Utilities	12	Events	$500	$6,000
6	Mowing	2	Events	$3,480	$7,000
7	Fence Repairs and Security	1	LS	$500	$500
8	Administration	1	Events	$2,000	$2,000
9	Leachate System Maintenance & Sampling	1	Events	$2,500	$2,500
10	Leachate Collection and Treatment	11,600	gallons	$0.0235	$300
11	Water Quality Monitoring & Report	2	Events	$23,000	$46,000
12	Groundwater Monitoring System Maintenance	1	Events	$2,300	$2,300
13	Contingency	10%		$103,200	$10,300
	Annual Total				$113,500
	30-YR Total				$3,405,000

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B

Post-Closure Inspection Checklists

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Quarterly Tasks

Date: _____

Name: _____

Action	Action Completed	Comments/Follow up
Inspection of leachate storage system		
Inspection of grass condition & removal of woody waste		
Inspection of utilities		
Inspection of stormwater management system (sediment basins, perimeter channels, etc.)*		
Other:		
Other:		

*Complete these tasks quarterly or within seven days of a major storm event, whichever is more frequent.

Notes:

Semiannual Tasks

Date: _____

Name: _____

Action	Action Completed	Comments/Follow up
Other:		
Other:		

Notes:

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Construction Certification

This demonstration is based on HDR's observations during construction, as-built documents,_____, and other relevant certifications. This document provides a demonstration that construction of the Brickhaven No.2 Mine Tract "A" Structural Fill meets the requirements of 40 CFR part 257 for a new CCR landfill with respect to the closure and post-closure care criteria.

This documents and certifies the following:

- Closure of the CCR unit meets the requirements of 40 CFR §257.102 (f) (3)
- Post-closure care of the CCR unit meets the requirements of 40 CFR §257.104 (e)

I have prepared or supervised the preparation of the attached documentation, that it has been prepared in general accordance with industry standards and practices, and that the information contained herein is truthful and accurate to the best of my knowledge.

I certify that that the demonstration meets the requirements of the closure and post-closure care criteria section of 40 CFR part 257.

Exceptions: (none) (as listed below)

_____

<name>
<title>

HDR Engineering, Inc. of the Carolinas
440 South Church St, Suite 1000
Charlotte, NC 28202-2075
704.338.6700
NC License F0116

<seal>

Design Certification – CCR Closure & Post-Closure

Brickhaven No.2 Mine Tract "A" Structural Fill

This demonstration is based on the following documents and referenced permits. This document provides a demonstration that the design of the Brickhaven No.2 Mine Tract "A" Structural Fill meets the requirements of 40 CFR part 257 for a new CCR landfill with respect to the closure plan and post-closure plan criteria.

- Brickhaven No.2 Mine Tract "A" Structural Fill Permit Application, approved June 5, 2015
- Permit 1910 StructFill PTC-PTO DIN23655, issued June 5, 2015
- Brickhaven No.2 Mine Tract "A" Mine Permit Application, approved June 5, 2015
- Permit 19-25 Mining Permit, issued June 5, 2015
- Brickhaven No.2 Mine Tract "A" Structural Fill CCR Compliance Supplement, dated July 2015 – includes the Closure and Post-Closure Care Documentation and the revised Closure and Post-Closure Plan
- Permit 1910 Technical Specification Updates DIN24794, approved July 27, 2015
- Permit 1910 GW and Basegrade Updates approved DIN24779, approved July 27, 2015
- NCDENR 401 Permit No.4026, issued July 31, 2105
- Permit 19-25 Rail Spur Modification, Brickhaven, approved September 1, 2015
- USACE 404 Permit No.SAW-2014-02254, issued September 3, 2015
- NCDEQ Pump and Haul Permit, Brickhaven, approved September 22, 2015
- Permit 1910 Brickhaven Water Quality Monitoring Plan, updated October 2015
- Permit 1910, Brickhaven Operations Plan, revised October 2015

This documents and certifies the following:

- The closure plan for the new CCR landfill unit meets the requirements of 40 CFR 257.102(b)(4)
- The post-closure plan meets the requirements of 40 CFR §257.104(d)(4)

I have prepared or supervised the preparation of the referenced documentation; it has been prepared in general accordance with industry standards and practices; and the information contained herein is truthful and accurate to the best of my knowledge.

I certify that the demonstration meets the requirements of the closure and post-closure care section of 40 CFR part 257 as it relates to the closure and post-closure plans.

Exceptions:

1. Notification of this certification is not being sent to the relevant State Director at this time.

Michael D. Plummer, PE
Project Manager

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