

CCR Landfill Closure Plan

**Twin Oaks Power Generating Station
13065 Plant Road
Bremond (Robertson County), Texas 76629**

September 29, 2016

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1.0 Introduction

The following CCR Closure Plan is intended to fulfill the requirements of Coal Combustion Residual Rule 40 CFR §257.102 (Criteria for Conducting the Closure of CCR units) for the existing Twin Oaks Power (TOP) Utility Landfill located near Bremond, Texas. Section 40 CFR §257.102 requires that an owner or operator of a CCR landfill prepare a Closure Plan to describe the steps necessary to close the landfill or portion thereof at any point during its intended operating life in accordance with generally accepted practices.

In accordance with 40 CFR §257.102 the CCR Closure Plan must include:

- A narrative description of how the CCR unit will be closed;
- If closure of the CCR unit will be accomplished through removal of CCR, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with §257.102(c);
- If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover, designed in accordance with paragraph §257.102(d) and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover will achieve the performance standards specified in §257.102(d);
- An estimate of the maximum inventory of CCR ever onsite over the active life of the CCR unit;
- An estimate of the largest area of CCR unit ever requiring a final cover as required by §257.102(d) at any time during the CCR unit's active life;
- A schedule for completing all activities necessary to satisfy closure criteria, including an estimate of the year in which all closure activities will be completed as well as duration of such activities as required by §257.102(b)(vi).

In addition, the owner or operator of the CCR unit must comply with the requirements of §257.102(g), (h), (i) and (j), which pertain to notification of intent to close, notification of closure, deed notations, and recordkeeping requirements, respectively.

The following constitutes the initial Closure Plan for the CCR landfill as required under 40 CFR §257.102.

2.0 Closure Plan

The purpose of this Closure Plan is to describe the steps necessary to close the landfill or portion thereof at any point during its intended operating life, in accordance with 40 CFR §257.102. Per §257.102(b)(1)(i) this section provides a narrative description of CCR unit closure. The Twin Oaks CCR Landfill will be closed leaving CCR in place by constructing a final cover system (in accordance with §257.102(d)[3]) over the entire area of the unit, and complying with other applicable requirements of the CCR rule.

2.1 Final Cover System Design

Part 40 CFR §257.102(b)(1)(iii) requires a description of the final cover system designed in accordance with §257.102(d) and a demonstration of compliance with the performance standards specified in §257.102(d)(1).

2.1.1 Final Cover Description and Performance Standard

The final cover for the CCR landfill is planned to minimize infiltration and erosion and will meet the minimum requirements provided by §257.102(d)(3)(i). The final cover system will consist of an infiltration layer with a minimum thickness 18 inches of clayey soils with a minimum hydraulic conductivity of 1×10^{-7} cm/s, equal to the permeability of the existing landfill bottom soil liner and in-situ subsoil thereafter (in accordance with §257.102(d)[3][i][A] and [B]). Furthermore, compacted and cured CCR material underlying the final cover system has been shown through laboratory testing to possess a hydraulic conductivity of approximately 1.0×10^{-5} cm/s, further precluding the infiltration of surface water into disposed material. Because of the final cover infiltration layer and low permeability of the cured CCR material, the amount of infiltration through the material is expected to be negligible.

A vegetation layer consisting of a minimum thickness of six (6) inches will be placed atop the infiltration layer (in accordance with §257.102(d)[3][i][C]). The soils used for the vegetative layer shall be conducive to supporting and sustaining vegetative growth.

2.1.2 Final Cover Integrity and Stability

Disposed CCR material when spread and compacted cures and hardens quickly into a solid low-strength concrete like mass with unconfined compressive strengths ranging from 1,000 psi for fly ash and 100 psi for bottom ash and hydraulic conductivity of 1×10^{-5} cm/s. Conditioned CCR material disposed in the landfill is placed in lifts with a maximum thickness of 12 inches and then compacted with a smooth drummed compactor (or similar

equipment). Coupled with this disposal process and the CCR material's curing properties substantially reduces the likelihood of localized subsidence or differential settlement within the disposal area.

Construction of the final cover system will be placed directly on cured CCR material that has been graded smooth (or placed) in accordance with design sequence schematics to facilitate final cover placement.

The final surface of the landfill cover shall be graded to promote drainage, minimize erosion of cover material, prevent ponding and provide a surface drainage system. The side slopes of the landfill's final cover surface will not be steeper than 3:1 (H:V) to prevent erosion and facilitate maintenance activities. The slopes of the landfill shall be constructed in vertical lifts of approximately 20 feet. A bench or terrace will be constructed with a minimum width of 10 feet every 20 feet of vertical rise. Construction of benches or terraces will reduce the velocity of storm water runoff (sheet flow), provide stability, and minimize erosion of the final cover.

The final grade maintained on top of the landfill should have a minimum slope of one (1) percent and maximum of five (5) percent, and provide positive drainage to down drain locations that will safely convey storm water flow to the slope bottom and to subsequent drainage features.

At the time of final cover system construction, quality control and quality assurance measures will be implemented such that the final cover will be constructed as designed and maintain stability and integrity throughout the closure and post-closure periods, as required by §257.102(d)(1)(iii). Stabilization of the final cover will be aided by employing maintaining maximum side slopes of 3:1 (H:V), application of geosynthetics (as necessary) to prevent erosion or sloughing, diverting and providing conveyance for surface drainage via down drains, hydro-mulching (or normal husbandry activities for the area) and/or other generally accepted engineering measures to prevent instability in the cover system.

Placement of final cover soils (infiltration and vegetation layer) should be placed starting at the bottom of the slope and working up the slope, if practical. In some cases, this may not be possible or practical.

2.2 Methods and Procedures for Final Cover Installation

In accordance with §257.102(b)(1)(iii) the following section includes a description of the methods and procedures to be used to install the final cover system. During installation of the final cover, construction quality assurance will be performed to verify compliance with this Plan and the CCR rule. Construction oversight should include:

- Observation that the final CCR material surface (subgrade material) is free of debris or similar that could affect the construction or performance of the final cover;
- Verification that clayey soils used for the infiltration layer shall be free of deleterious material, placed over waste material in loose lift thickness of 12 inches or less and compacted to 95 percent of Standard Proctor maximum dry density, or as required by laboratory test results to meet §257.102[d][3][i][A];
- Observation and documentation of placement of infiltration soils meeting the criteria specified by §257.102[d][3][i][A]. Laboratory testing should be completed on selected infiltration soils prior to placement and periodically tested to insure continued compliance. All clayey soils should be placed under proper moisture and density control (and documented) as provided by laboratory test results or supervising qualified professional engineer;
- Verification and documentation of final cover thickness (includes both infiltration and vegetative layers). Final cover thicknesses may be verified through accepted survey techniques or in-situ testing of placed soils. Any test locations that disturb placed and compacted soils of the infiltration layer should be backfilled with hydrated bentonite. Disturbance to placed liner should be minimized or avoided;
- Verification that the final cover system is properly protected by temporary erosion control measures and vegetated with the appropriate cover for the season (warm or cool season).
- Obtain material conformance information, field forms, laboratory testing of soils and as-built survey information.

The methods and materials of construction discussed above were specified such that the final cover meets the performance standard §257.102(d)(1)(v). Specific equipment requirements and the means and methods of placement are the responsibility of the final cover contractor; regardless the final cover shall meet the requirements specified herein.

2.2.1 Temporary Erosion and Sediment Control

Prior to the start of final cover construction, temporary erosion control features (i.e.. silt fencing or other erosion control BMPs) will be installed as necessary. Employed temporary

erosion control features will be inspected every seven (7)-calendar days until adequate vegetative cover is achieved. Temporary erosion control features will be repaired or replaced if any such features have been damaged from runoff or if there is excessive sediment buildup that would impede the performance or protection of the feature.

2.3 Maximum Inventory of CCR

In accordance with §257.102(b)(1)(iv), the maximum estimated inventory of CCR material disposed in the landfill is approximately 18 million cubic yards.

2.4 Maximum Area Requiring a Final Cover

In accordance with §257.102(b)(1)(v), the largest estimated area requiring final cover at any one time in the CCR unit's active life is approximately 129 acres.

The owner or operator may apply final cover throughout the facility's active life in accordance with this plan as areas are filled or placement of CCR material is completed.

2.5 Closure Schedule

It is expected the final receipt of CCR material in the unit will occur immediately prior to commencement of closure construction. However, the owner or operator periodically removes CCR material from the landfill for beneficial use. The closure schedule provided herein may be revised in the event that CCR is being removed for beneficial use when the final receipt of CCR material occurs. Closure activities will commence within two (2) years of the last receipt of waste or last removal of CCR material for the purpose of beneficial use provided by §257.102[e][2][i]. The owner or operator of the CCR landfill will provide the required information provided by §257.102[e][2][ii] if an extension is requested.

The conceptual schedule below provides the major milestones expected during closure activities per §257.102(b)(1)(vi).

Project Milestone	Maximum Allowable Completion Time
Final Closure System Design	Prior to Commencing Closure
Commencement of Closure Activities	Within 30 days of final receipt of CCR ¹
Complete Construction of Closure Activities	Within 6 months of commencing closure ²
Notes: ¹ - Unless owner/operator demonstrates requirements per §257.102(e)(2)(i); ² - Unless owner/operator demonstrates requirements per §257.102(f)(2)(i).	

Based on the estimated remaining disposal volume and disposal rate, it is currently forecasted that final closure activities may occur during 2042.

Prior to commencing closure activities, an engineering review of the final closure design will be completed and if necessary, modified accordingly to ensure compliance with the applicable CCR rules.

2.6 Notifications and Recordkeeping

The owner or operator of the CCR landfill must comply with the requirements provided by §257.105(i). These requirements include notification of intent to close, notification of closure, deed notations, and recordkeeping requirements. The following are milestones that will be observed in order to comply with these requirements:

- Notification of Intent to Close (§257.102[g]) – This notification must be placed in the operating record no later than the date the owner or operator initiates closure of the CCR unit. The notification must include the certification required in §257.102(d)(3)(iii), provided herein or as included in subsequent amendment to this initial plan (per §257.102[b][3][i]);
- Notification of Closure (§257.102[h]) – This notification must be placed in the operating record within 30 days of completion of closure of the CCR unit. The notification must include certification from a qualified professional engineer verifying that closure of the CCR unit has been completed in accordance with this Plan, or subsequent amendments (per §257.102[f][3]);
- Deed Notations (§257.102[i]) – The CCR rule does not provide timing requirements for recording notations on the deed to the property following closure. However, within 30 days of recording a notation on the deed to the property, the owner or operator must prepare a notification stating that the notation has been recorded. In accordance with §257.102[i][3], the owner or operator has completed the notification when it has been placed in the facility’s operating record;
- Closure Recordkeeping Requirements (§257.102[j]) – The owner or operator of the CCR unit must comply with the closure recordkeeping requirements specified in §257.102(j), the closure notification requirements specified in §257.106(i), and the closure Internet requirements specified in §257.107(i).

3.0 CCR Landfill Closure Plan Certification

By means of this certification, (i) this initial CCR Landfill Closure Plan has been prepared, and reviewed in accordance with good engineering practice, (ii) it is my professional opinion that the Plan was prepared consistent with the minimum requirements of 40 CFR §257.102, (iii) I or my agent has visited and examined the facility, (iv) this certification is not and shall not be interpreted or construed as a guarantee, warranty or legal opinion, and (v), this certification in no way relieves the owner or operator of the facility of his/her duty to fully implement this Plan.

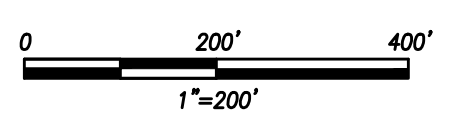
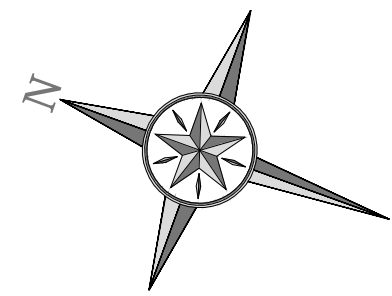
By: 

Dated: September 29, 2016



TBPE Firm Registration No. F-16721
Expires 2/28/2017

Appendix



LOCATIONS OF DOWN DRAIN STRUCTURES ARE APPROXIMATE. FURTHER DESIGN SHALL BE REQUIRED TO DETERMINE FINAL LOCATIONS.

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NO.	REVISION	BY.	DATE

- PERIMETER DITCH
- EXISTING ASH SURFACE
- EXISTING ACCESS ROAD
- PROPOSED ASH SURFACE
- PROPOSED ACCESS ROAD
- DOWN DRAIN STRUCTURE

ASH DISPOSAL SITE BREMOND, TEXAS			
PHASE 3 ACTIVE ASH FILLING SEQUENCE			
TWIN OAKS POWER			
DR. BY AKRON	APPROVAL AKRON	DATE AUG 2016	DWG. NAME PHASE 3
			SHEET 3 OF 3