Amended
CCR Landfill Closure Plan

Limestone Electric Generating Station
Jewett, Texas

February 2020

Prepared For

NRG Texas Power LLC

CERTIFICATION

Amended CCR Landfill Closure Plan

Limestone Electric Generating Station

I, the undersigned Texas Professional Engineer, hereby certify that I am familiar with the technical requirements of Title 40 Code of Federal Regulations Part 257 Subpart D (§257). I certify that it is my professional opinion that this document meets the requirements for a written closure plan prepared pursuant to 40 CFR 257.102. I also certify that this document was prepared by me and that I am a registered professional engineer under the laws of the State of Texas.

For the purpose of this document, "certify" and "certification" shall be interpreted and construed to be a "statement of professional opinion". The certification is understood and intended to be an expression of my professional opinion as a Texas Licensed Professional Engineer, based upon knowledge, information, and belief. The statement(s) of professional opinion are not and shall not be interpreted or construed to be a guarantee or a warranty of the analysis herein.

Richard D. Varnell
Printed Name of Professional Engineer

135525
Texas License Number

Richard Varnell
Signature of Professional Engineer

2/27/2020
Date

FIRM #3775

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1. INTRODUCTION & PURPOSE

Federal CCR Rule Reference: 40 CFR 257.102(b)

Pursuant to 40 CFR 257.102(b), this document serves as the written closure plan for the existing coal combustion residual (CCR) landfill, Unit 004 Landfill, at NRG Texas Power LLC's (NRG) Limestone Electric Generating Station. NRG intends to close the landfill in compliance with the requirements of 40 CFR 257.102(d), by leaving the CCR in place and installing a final cover system.

2. CLOSURE PLAN NARRATIVE DESCRIPTION

Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(i) and 257.102(d)(1)

As disposal areas within the landfill reach capacity, the stored CCR will be graded to designed contours, and a protective final cover system will be incrementally installed to minimize infiltration and prevent storm water contact with the CCR. Materials for the final cover system are placed and compacted so as to limit erosion, settling, subsidence, and future maintenance, and to maintain positive drainage. As portions of the final cover system are installed, soil properties, compaction, permeability, and thickness testing are performed to confirm compliance with the Amended Closure Plan and federal and state regulations in effect at the time. Eventually, the entire landfill will be encapsulated with a final cover system as described in Section 3 of this Amended Closure Plan.

At the time this Amended Closure Plan was prepared, NRG had installed the final cover system over areas that had reached their design capacities in the western portion of the landfill. Soil properties, compaction, and thickness testing of the cover material were performed during installation. Most of the western portion of the landfill ceased accepting CCR and the final cover system had been installed prior to the effective date of the CCR Rule on October 19, 2015.

3. FINAL COVER SYSTEM DESCRIPTION

Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(iii) and 257.102(d)(1)

Pursuant to the closure performance standards provided in 40 CFR 257.102(d)(1), the final cover system for Unit 004 Landfill will:

1. Ensure the design of the final cover system accommodates settling and subsidence to protect the integrity of the final cover system.
2. Minimize the post-closure infiltration of liquid into the CCR.
3. Minimize the risk of release of CCR or contaminated run-off to the ground or surface waters, or to the atmosphere.
4. Preclude the probability of future impoundment of water, sediment, or slurry.
5. Provide major slope stability to prevent sloughing of the final cover system during the post-closure care period.
6. Minimize future maintenance.

7. Allow closure activities to be completed as quickly as practical consistent with recognized and good engineering practices.

3.1 ESTABLISH GRADE AND SUPPORT FOR FINAL COVER SYSTEM

Federal CCR Rule Reference: 257.102(d)(1)(ii), 257.102(d)(1)(iii) & 257.102(d)(3)(i)(D)

Per the CCR Rule, the upper surface of the stored CCR, or possibly general fill if sufficient quantities of CCR are not available, will be graded to form a mounded profile. The top of the mound will be graded from a high point or ridge with 3 to 5 percent slope outward. At the crest of the side slopes, a perimeter drainage swale will be constructed to intercept storm water and minimize flow from the upper area to the side slopes. These drainage swales will be directed to armored or paved drainage ditches that will channelize flow down the side slope and into a second ditch system that encircles the base of the landfill. The slopes have also been designed to accommodate settling and subsidence while maintaining this positive drainage strategy.

3.2 INFILTRATION LAYER

Federal CCR Rule Reference: 257.102(d)(1)(i), 257.102(d)(3)(i)(A), & 257.102(d)(3)(i)(B)

Per 257.102(d)(i)(A) and (B) of the CCR Rule, an infiltration layer consisting of compacted low permeability clay material, will be placed on top of the graded CCR or general fill to minimize infiltration of liquids into the closed CCR unit. Per the CCR Rule, the infiltration layer will consist of a minimum thickness of 18 inches of compacted clay material. The clay infiltration layer will have a permeability no greater than 1×10^{-7} centimeters per second (cm/sec) to match the permeability of the in-place bottom liner system.

3.3 EROSION LAYER

Federal CCR Rule Reference: 257.102(d)(3)(i)(C)

Per 257.102(d)(i)(C) of the CCR Rule, an erosion layer, consisting of topsoil capable of sustaining native plant growth, will be provided above the infiltration layer to minimize erosion of the final cover system. Per the CCR Rule, the erosion layer will consist of a minimum of 6 inches of toposil. The entire surface of the final cover system for the closed landfill will be seeded with native vegetation, and regular maintenance of the seeding will take place until a vegetative cover is established and self-sustaining. The storm water run-off management strategy described in Section 3.1 further minimizes erosion of the final cover system.

4. ESTIMATED MAXIMUM INVENTORY OF CCR

Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(iv)

As of December 2019, approximately 30.26 million cubic yards of CCR had been disposed within the landfill. It is estimated that the landfill may store approximately 50 million cubic yards of CCR prior to the landfill reaching design capacity.

5. ESTIMATED COVER SURFACE AREA

Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(v)

The final cover system is estimated to encapsulate an area of approximately 425 acres. Approximately 195 acres of the final cover system was installed as of December 2019. NRG will continue to incrementally cover areas of the landfill as these areas reach capacity. It is estimated that the largest surface area that may require cover at any point in time in the remaining life of the landfill is approximately 100 acres.

6. CLOSURE SCHEDULE

Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(vi)

Table 1 identifies major milestones necessary to close the landfill with an estimated duration and an estimated year of completion for each milestone. NRG estimates that all closure activities for the CCR landfill will be complete by the year 2050.

Table 1: Planning Level Schedule for Closure of Existing CCR Landfill

Task Description	Estimated Duration	Estimated Completion Year
Place Amended Closure Plan into the Facility's Operating Record (FOR).	1 Day	2020
Send Notification of the Availability of Amended Closure Plan to the Texas Commission of Environmental Quality (TCEQ) and Post the Amended Closure Plan to NRG's CCR Website.	1 Month	2020
Deposit CCR into the Landfill Until Disposal Capacity is Reached.	Ongoing	2050
Final Grading of CCR Material to Designed Slopes and Contours.	Ongoing	2050
Place Final Cover System as Areas Reach Capacity.	Ongoing	2050
Place Notification of Intent to Close into FOR.	1 Month	2050
Certification of Completion of Closure by a Qualified Texas Professional Engineer.	1 Month	2050
Place Notification of Landfill Closure Completion into FOR.	1 Month	2050
Send Notification of Completion of Closure to the TCEQ & Post Notification of Completion of Closure to NRG's CCR Website.	1 Month	2050
Record a Notation of CCR Landfill Closure on the Deed of the Property.	1 Month	2050
Place Notification of the Deed Notation into Station's Operating Record.	1 Month	2050

Table 1: Planning Level Schedule for Closure of Existing CCR Landfill		
Task Description	**Estimated Duration**	**Estimated Completion Year**
Send Notification of the Deed Notation to the TCEQ & Post Notification Recording a Notation on the Deed to NRG's CCR Website.	1 Month	2050

7. AMENDMENTS TO CLOSURE PLAN

Federal CCR Rule Reference: 40 CFR 257.102(b)(3)

NRG will amend this plan prior to a change in the operation of the CCR landfill that would substantially affect the written closure plan in effect or after an unanticipated event necessitates a revision to the written closure plan. If this written closure plan is revised, NRG will retain a qualified professional engineer licensed in the State of Texas to provide written certification that amendments to this plan meet the requirements of 40 CFR 257.102(b).

8. COMPLETION OF CLOSURE ACTIVITIES

Federal CCR Rule Reference: 40 CFR 257.102(f)(3)

Upon completion of closure, NRG will obtain a certification from a qualified professional engineer licensed in the State of Texas verifying that the Unit 004 landfill has been closed in accordance with the closure plan in effect at the time of closure.