2022 Annual Inspection of CCR Unit

Limestone Electric Generating Station
Jewett, Texas

January 2023

Prepared For

NRG Texas Power LLC

14701 SAINT MARY'S LANE, SUITE 500, HOUSTON, TEXAS 77079 ● 713.244.1073 PHONE ● WWW.TRCCOMPANIES.COM

CERTIFICATION

Annual Inspection of CCR Unit

Limestone Electric Generating Station

I, the undersigned Texas Professional Engineer, hereby certify that I am familiar with the technical requirements of 30 Texas Administrative Code (TAC) Chapter 352 and Title 40 Code of Federal Regulations (CFR) Part 257 Subpart D (§257). I also certify that it is my professional opinion that, to the best of my knowledge, information, and belief, that the information in this demonstration is in accordance with current good and accepted engineering practice(s) and standard(s) and meets the requirements of 30 TAC §352.841. I certify that this Report 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, P.E.

135525
Texas License Number

Richard Varnell
Signature of Professional Engineer

1/16/2023
Date

STATE OF TEXAS
RICHARD D. VARNELL
135525
LICENSED
PROFESSIONAL ENGINEER

Firm #3775

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

On December 5, 2022, a representative of TRC Environmental Corporation (TRC) performed an inspection of the CCR landfill (Unit 004) at the Limestone Electric Generating Station, located at 3964 FM 39, Jewett, Texas. This work was performed to satisfy the requirement for an annual inspection by a qualified Texas professional engineer, as required by 30 Texas Administrative Code (TAC) Chapter 352, Coal Combustion Residuals Waste Management and Registration Program for Coal Combustion Residuals (CCR) Implementation (Reference 1).

The applicable CCR unit was visually inspected by Mr. Richard Varnell, P.E. (Licensed in Texas) and Mr. Patrick Shin, EIT (Texas). The inspection included performing a visual inspection of the CCR unit to identify any areas requiring maintenance and showing signs of distress or malfunction. TRC also reviewed the available documentation related to the CCR unit at the Limestone Electric Generating Station.

This inspection evaluated the following CCR unit:

- Active and uncapped portions of the Unit 004 Landfill.

The provisions of 30 TAC Chapter 352 do not apply to CCR units that no longer receive CCR after the effective date of 40 CFR Part 257, Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule, April 17, 2015 (Reference 2) on October 19, 2015. Although, not required under 30 TAC Chapter 352, TRC also inspected capped portions of the Unit 004 Landfill that were closed prior to April 19, 2015.

TRC did not observe any evidence of ongoing or imminent failure of this CCR unit. There were no structural deficiencies noted based on TRC's observations. No changes in geometry were noted. No specific maintenance items were identified in this annual inspection. Ongoing maintenance efforts to promote grass vegetation, stabilize roads and slopes, and mitigate damage from feral hogs should continue.

Based on a review of available documents and the visual inspection, it is TRC's opinion that the Unit 004 Landfill has been designed, constructed, is currently operated, and is maintained in a manner that is consistent with and in accordance with recognized and generally accepted good engineering practice.

2. INTRODUCTION

This report presents the observations and findings of the 2022 calendar year inspection for the CCR unit at the Limestone Electric Generating Station. The Limestone Electric Generating Station is located near Jewett, Texas. Specifically, the majority of the generating station is located in Limestone County, while the CCR unit is located in Freestone County. The Limestone Electric Generating Station is owned and operated by NRG Texas Power, LLC.

The Limestone Electric Generating Station includes two coal fired generating units with a total rated net capacity of 1689 megawatts (MW). The Limestone Electric Generating Station is fueled by coal imported from the Powder River Basin in Wyoming.

The general arrangement of the Limestone Electric Generating Station and the 004 Unit Landfill are depicted in Figure 1.

3. PURPOSE/OBJECTIVE

This report has been prepared to document compliance with the annual inspection requirements for CCR units as provided in 30 TAC Chapter 352. Specifically:

- Section 352.841 pertains to the annual inspection requirements for CCR landfills.

This report documents the annual inspection by a qualified Texas professional engineer for the currently active areas of the 004 Unit Landfill (areas that received CCR after October 19, 2015). NRG provided prior reports and design drawings to TRC as inputs for this inspection. The following CCR unit was inspected:

- Unit 004 Landfill.

3.1. LANDFILL INSPECTION

The tasks performed as part of the annual inspection and documented in this report are listed below.

- Inspection of the landfill by a qualified Texas professional engineer to evaluate if the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practice.
- Review of available operational records and information concerning the status and condition of the landfill, including, but not limited to, files available in the operating record, the results of weekly inspections by a qualified person, and the prior annual inspection report.
- Visual inspection of the landfill to identify signs of distress or malfunction of the landfill.
- Preparation of this annual inspection report, as required by §352.841, to address the following:
    - Any changes in geometry of the landfill since the previous annual inspection;
    - The approximate volume of CCR contained in the landfill at the time of inspection;
    - Any appearances of actual or potential structural weaknesses of the landfill, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the landfill; and
    - Any other change(s) which may have affected the stability or operation of the landfill since the previous annual inspection.

4. CCR LANDFILL DESIGN & BACKGROUND

The landfill is located east of FM 39. The landfill is designated as a Class II Industrial Waste Landfill under the criteria of the Texas Commission on Environmental Quality (TCEQ). The landfill is managed based on the areas indicated on Figure 2. These areas have no physical boundaries in the landfill. As of

the date of the annual inspection, the areas are in one of three stages: Capped, uncapped, and future expansion areas.

The landfill bottom liner consists of compacted clay with a minimum thickness of 2 feet. Capped areas have a final cover system consisting of compacted clay with a minimum thickness of 3 feet covered with a minimum of 1 foot of vegetated topsoil.. NRG reports that quality control and assurance testing was performed during construction of both the clay liner and final cover systems.

Stormwater runoff from capped and uncapped/active portions of the landfill is managed separately. Grassed berms located on the capped areas prevent runoff from flowing from capped to uncapped areas. Instead, the stormwater runoff is directed using berms, surface grades, and concrete lined conveyances from capped areas to a perimeter ditch that discharges to Lynn Creek.

An interceptor ditch surrounds the uncapped areas that contain CCR that intercepts this stormwater runoff and any CCR that that may eroded from the uncapped areas. This interceptor ditch drains into Pond 002. Pond 002 is not considered to be a CCR surface impoundment under the 30 TAC Chapter 352 since it was constructed to manage stormwater and not as a CCR management unit.

5. CCR UNIT INSPECTION OBSERVATIONS & FINDINGS

On December 5, 2022, Mr. Richard Varnell, PE (TX), Mr. Patrick Shin, EIT (TX), and Mr. Jason Scott of NRG, visually inspected the Unit 004 Landfill at the Limestone Electric Generating Station. This visual inspection was performed to evaluate if the design, construction, operation, and maintenance of the landfill is consistent with recognized and generally accepted good engineering practice. The individual operational areas at the landfill are depicted on Figure 2. The individual areas discussed in this report are also depicted on Figure 2.

The 004 Unit Landfill at the Limestone Electric Generating Station is a single CCR unit that has distinct areas for waste storage. For this report, the landfill is considered to be in three distinct life cycle stages:

- Landfill areas that have been filled, capped, and vegetated are considered “capped areas.”
- Landfill areas that currently receive CCR or that have significant areas with exposed CCR are considered “uncapped areas.”
- Future expansion areas of the landfill where a minimum 2-foot thick clay liner has been installed for future CCR placement. These areas were referred to as “areas under construction” in previous Annual Inspection reports.

5.1. Capped Areas

Although landfill Areas 1, 2, 3, 5, 6, 9, and 10 are considered to be capped, exposed slopes of CCR are present in Areas 1, 3, 6, and 10, where uncapped and future expansion areas will abut the existing CCR material (Figure 2). The plateaued portion of the capped areas is well vegetated and generally well graded to prevent the localized ponding of stormwater and to direct the flow of stormwater as depicted in Photographs P-1 through P-4.

Drainage structures constructed to transfer stormwater from the top of the capped areas to the perimeter ditch consist of concrete lined rundown channels. One rundown channel is present in Area 1 and a second is present in Area 5. Some cracking was observed in these rundown channels, but they are considered to be in good condition as shown in Photograph P-11.

The rundown channels discharge into a perimeter drainage ditch that flows around the west and south sides of the landfill. Since the flow in these channels consists of stormwater from the capped areas of the landfill and has not come into contact with CCR, this stormwater flow is managed separately from the perimeter interceptor ditch that collects stormwater that has come into contact with CCR from uncapped areas of the landfill ("contact water"). The perimeter interceptor ditch is visible in Photographs P-8 and P-10. The perimeter interceptor ditch directs contact water to Pond 002 (Photograph P-5).

The side slopes of the capped landfill areas are well vegetated and have appropriate perimeter ditches as depicted in Photographs P-5, P-6, P-11, and P-12. As mentioned above, the east sidewalls of Areas 1 and 3, the southeast corner of Area 6, and the east sidewall of Area 10 are not vegetated. These areas abut active or future expansion areas of the landfill. The exposed CCR material sidewalls of Areas 6 and 10 these areas are shown in Photograph P-8. Stormwater that comes into contact with the exposed CCR material is captured in the contact water perimeter ditch system and directed to Pond 002.

Historical reports indicate that some water seepage was observed at the landfill toe near the southern corner of Area 9. A series of french drains were historically installed in this area to collect this seepage which then discharges into a sump as described in previous Annual Inspection reports. The sump discharges to Pond 002. TRC did not observe any evidence of ongoing seepage on December 5, 2022.

TRC did not observe visual evidence of slope instability in the capped portions of the landfill during the annual inspection.

5.2. Uncapped Landfill Areas

Areas 4, 7, 8, 11, 12A, and 12B are considered to be uncapped areas. Areas 4, 7, and 8 have been partially closed, but are considered to be "uncapped" because significant portions of these areas have uncapped CCR slopes or surfaces. Area 11 is an active area where marketable CCR was formerly stockpiled prior to sale and off-site transportation. Areas 11 and 12A are an active portion of the landfill where CCR is currently being placed. These operations are shown in Photographs P-7, P-8, and P-9.

Given the dynamic nature of active landfill areas, the comments presented herein are based on the TRC observations made on December 5, 2022 and may or may not represent the conditions present at other times. The "work in progress" nature of active landfill areas result in exposed slopes of CCR that will either be capped, or where future expansion areas will be filled and the existing CCR slope will be abutted by material placed in the new area. These exposed CCR slopes are encompassed by the interceptor ditch that collects stormwater runoff from uncapped areas and collects any CCR that may erode or slough off the exposed CCR slopes. CCR slopes can be steep, but the stabilized material hardens to form an erosion and slough resistant slope.

As discussed above, Areas 4, 7, and 8 have been partially closed, but are considered "uncapped" because significant portions of these areas have uncapped CCR slopes or surfaces. These slopes appear

to be stable due to the cohesive nature of the CCR. In particular, a large portion of Area 8 has been closed, and a drainage feature separates stormwater runoff from the capped portion of this area from the uncapped portion. This feature bridges the interceptor ditch used to capture CCR contact water.

There are currently two haul roads used to transport CCR to the active portions of the landfill. One of the haul roads passes through Areas 11, 7, 8, and 12A. The second haul road passes through Area 12A. Both roads have been improved with bottom ash and neither had significant rutting.

Contact water from all of the uncapped CCR slopes and disposal areas discharges into the interceptor ditch as shown in Photograph P-10. The interceptor ditch is located adjacent to the outer perimeter of these areas and directs the stormwater runoff and any eroded CCR to Pond 002.

Since this area is a work in progress and since the interceptor ditch is functioning to collect contact water and eroded CCR, it is TRC's opinion that this area is operated in accordance with generally accepted industry standards.

5.3. Future Expansion Areas

Areas 12B and 13 through 20 are future expansion areas. A clay liner with a minimum thickness of 2 feet was constructed at portions of these cells prior to the effective date of the Federal CCR Rule. A protective layer of topsoil was placed on top of the clay liner. The protective layer is well vegetated with grass.

5.4. Changes in Geometry

There are on-going internal changes in the active portions of the landfill. However, TRC observed no changes in the geometry of the boundaries of the Unit 004 Landfill.

5.5. Review of CCR Inventory

As required by the Federal CCR Rule, the approximate volume of stored CCR in the landfill, as provided by NRG, is:

- Unit 004 Landfill: Approximately 30.80 Million cubic yards.

Approximately 139,000 cubic yards of CCR were added to Unit 004 in 2022.

6. REVIEW OF WEEKLY INSPECTIONS

The weekly inspections by a qualified person (by NRG) have been performed and TRC has reviewed the reports. The inspections appear to be thorough and appropriately executed. Maintenance items were identified, resolved, and documented in subsequent inspections.

7. MAINTENANCE RECOMMENDATIONS

At the time of this inspection, there were no repairs needed that posed immediate operational or safety concerns for the Unit 004 Landfill. Based on the observations made by TRC on December 5, 2022, TRC recommends that the current maintenance practices be continued. These practices include control of vegetation and feral hogs, and repair of minor erosion areas before they become significant.

8. CRITERIA

This inspection has been performed in accordance with the inspection requirements of 30 TAC Chapter 352 (Reference 1) and generally accepted engineering practice. The TCEQ Guidelines for Operation and Maintenance of Dams in Texas (Reference 3) is considered to represent generally accepted practices and is considered to be an applicable criterion.

9. LIMITATIONS

Given the visual nature of this inspection, it must be recognized that latent conditions may be present that are not visually evident.

TRC reviewed operation and maintenance records provided by the facility. TRC is not responsible for the content, accuracy, or comprehensiveness of the records provided. Records were reviewed for completeness and compliance with the regulations and permit conditions.

Given the work in progress nature of the landfilling operations, this document only considers the conditions present at the time of the inspection and information provided by NRG.

10. REFERENCES

1) 30 TAC Chapter 352, Coal Combustion Residuals Management and Registration Program for Coal Combustion Residuals (CCR) Implementation, November 1, 2019.

2) 40 CFR Part 257, Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule, April 17, 2015.

3) Texas Commission on Environmental Quality, Guidelines for Operation and Maintenance of Dams in Texas, November 2006.

4) 2021 Annual Inspection of CCR Landfill Cells, Limestone Electric Generating Station, January 2022.

11. CONCLUSIONS

This annual inspection considered the following CCR unit:

- Unit 004 Landfill.

TRC did not identify any evidence of ongoing or imminent failure of the 004 Unit Landfill. No structural deficiencies were noted during the 2020 inspection.

Based on the review of available documents and the visual inspection, it is TRC's opinion that the Unit 004 Landfill has been designed, constructed, is currently operated, and is maintained in a manner that is consistent with recognized and generally accepted good engineering practice.

As discussed in Section 7, the ongoing maintenance efforts to promote grass vegetation, control erosion, and mitigate damage from feral hogs should continue. No other maintenance items were identified in this annual inspection.

FIGURES

HOU D:\Users\SRay\Downloads\ Fig 2 - NRG-LimestoneStation - Landfill_Adjusted.dwg 01/07/21

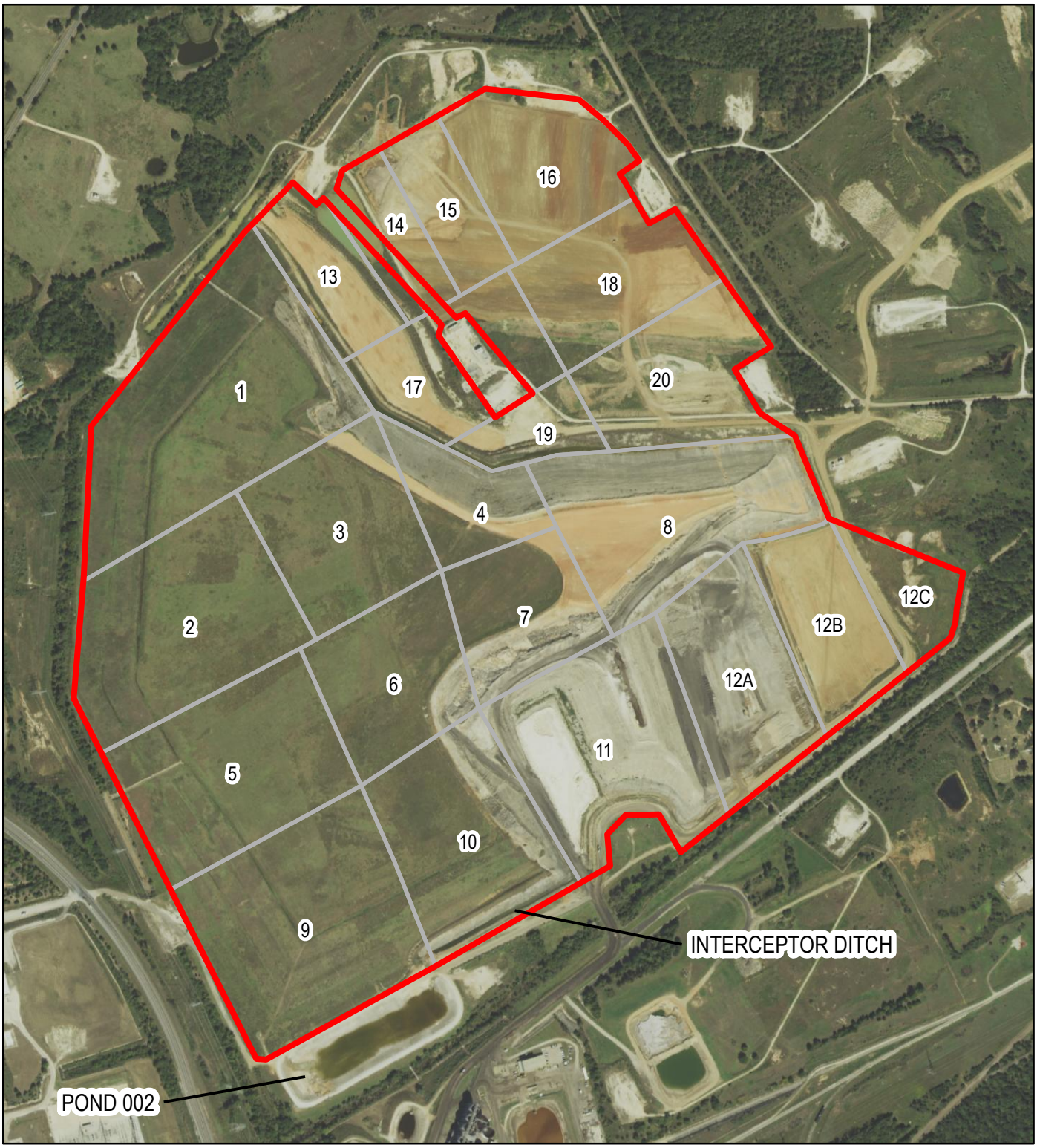
PROJECT:
NRG TEXAS POWER, LLC
Limestone Electric Generating Station
Jewett, Texas

TITLE:
LOCATION OF CCR LANDFILL

DRAWN BY:	O. Fonseka	PROJECT No.:	298367.2002.0000
CHECKED BY:	R. Varnell		**FIGURE 1**
APPROVED BY:	R. Varnell		
DATE:	January 2021		

TRC
10550 Richmond Ave.
Suite 210
Houston, TX 77042
Phone: 713.244.1000

FILE: Fig 2 - NRG-LimestoneStation - Landfill_Adjusted.dwg



SOURCE: (09/30/2016) USDA FARM SERVICE, NAIP IMAGERY

N

1 " = 850 '
1:10,195

0 850
FEET

Legend

SITE BOUNDARY

LANDFILL AREAS

TRC
505 East Huntland Drive
Suite #250
Austin, TX 78752
Phone: 512.329.6080
TRC - GIS

PROJECT:

NRG
LIMESTONE ELECTRIC GENERATING STATION

TITLE:

AERIAL VIEW OF UNIT 004 LANDFILL

DRAWN BY:	MJAGOE
CHECKED BY:	RPV
APPROVED BY:	
DATE:	JANUARY 2020
PROJ. NO.:	298637.1000
FILE:	298367_Figure2.mxd

FIGURE 2

S:\1-PROJECTS\NRG\Limestone\298367.100_GWReport_2019\298367_Figure2.mxd -- Saved By: MJAGOE on 1/9/2020, 15:54:08 PM

PHOTOGRAPHS

Photograph P-1: View looking southwest across the capped surfaces of Areas 1 and 2. The landfill cap appeared to be well vegetated and appropriately sloped. Higher grass is visible in a ditch running along the edge of the landfill crest.

Photograph P-2: View looking west of well vegetated, closed cap of Area 5.

Photograph P-3: View looking southwest from Area 9 of the Unit 004 Landfill.

Photograph P-4: View looking northeast across closed cap of Areas 9 and 10.

Photograph P-5: View looking south-southeast across down the side slope of Area 9 and across Pond 002. The slope is well vegetated with no visible sloughing or erosional issues. Pond 002 is a stormwater pond where contact stormwater is managed.

Photograph P-6: View looking northwest along Area 9 side slope. The slope is well vegetated with no visible sloughing or erosional issues.

Photograph P-7: View looking north from perimeter road (improved with bottom ash) at Area 11. A clay stockpile (red to tan material) is visible in the center left of this photograph.

Photograph P-8: View looking west of Area 11, where CCR material has been stockpiled prior to disposal.

Photograph P-9: View looking east from Cell 11 towards Cell 12A, where active landfilling is occurring.

Photograph P-10: View of exposed CCR sidewall of Area 8. This is the eastern sidewall of Area 8.

Photograph P-11: View looking southeast at the concrete drainage structure located in Area 1. The slope is well vegetated with no visible sloughing or erosional issues.

Photograph P-12: View looking north-northwest up sidewall of Area 10. The slope is well vegetated with no visible sloughing or erosional issues.