

FINAL

2020 ANNUAL INSPECTION REPORT

GRAND RIVER ENERGY CENTER - CCR LANDFILL

SOLID WASTE PERMIT NO. 3549012

Chouteau, Oklahoma

B&V PROJECT NO. 405290
B&V FILE NO. 41.0403

PREPARED FOR



GRDA/GREC

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BLACK & VEATCH

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1.0 Executive Summary

This report presents a summary of the annual inspection for the Grand River Dam Authority (GRDA) Coal Combustion Residual (CCR) landfill at the Grand River Energy Center (GREC) in Chouteau, Oklahoma. The annual inspection was completed by Black & Veatch on November 17, 2020. The annual inspection was completed in compliance with Oklahoma Administrative Code (OAC) 252:517-13-5 *Inspection Requirements for CCR Landfills*.

Requirements in 252:517-13-5 include review of available information regarding the landfill as well as a visual inspection of the landfill and appurtenant structures.

1.1 Summary of Findings

Inspection of the CCR landfill did not identify any signs of structural weakness or conditions that would disrupt or affect the safety of the landfill. There were no current concerns with existing conditions or the existing maintenance. Corrective actions of observations found in the weekly inspections should continue.

1.2 Recommendations

Based on the results of the inspection, Black & Veatch has no recommendations for improvements of the existing conditions or the maintenance program.

2.0 Inspection Team and Date of Inspection

2.1 Inspection Team

The inspection team consisted of one GRDA compliance officer and one Black & Veatch geotechnical engineer. The inspection team members included:

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2.2 Date of Inspection

The inspection team began their work at 11:55 a.m. on Tuesday, November 17, 2020 and completed their work at 1:35 p.m.

2.3 Weather During Inspection

The weather on the day of the inspection was sunny with an ambient temperature about 64° F and no wind. There had been no significant precipitation within the previous week and all surrounding conditions were dry.

3.0 Description of Landfill

3.1 General Design Information

The GREC power plant is located east of Chouteau within Mayes County, in northeastern Oklahoma. It was designed with a 490 MW Unit that was commissioned in 1981. The facility expanded operations in 1985 with a second unit rated at 520 MW. Unit 2 has a dry Flue gas desulfurization (FGD) scrubber for control of sulfur emissions.

The GREC landfill was permitted in 1979 as a Non-Hazardous Industrial Waste Landfill that is allowed to accept fly ash, bottom ash and spent powdered activated carbon used to control flue gas emissions, generated at the GREC facility. The original permitted landfill consisted of 116 acres, of which only 47 acres have been utilized for placement of CCR materials.

In October 2017, a request to modify the existing landfill permit was submitted to DEQ. The modification requested a reduction in landfill permit area from 116 acres to 67 acres. The request for permit modification has been approved by DEQ.

The original drawings for the landfill were completed in 1979 by Holway-United. The drawings show the embankments surrounding the landfill were constructed to Elevation 625 with a 16-foot wide top and 2 Horizontal to 1 Vertical side slopes, see Figure 3-1. Soil materials from inside the landfill area were used to construct the embankments.

The landfill was designed so that all surface water drainage is routed around the landfill area and into a series of permitted Class III industrial wastewater treatment impoundments regulated under an Oklahoma Pollutant Discharge Elimination System (OPDES) permit OK0035149. The industrial wastewater system consists of 11 process water and storm water retention/treatment basins around the western and southern perimeter of the landfill. These surface impoundments provide a total holding capacity of 1,371,521,000 gallons as stated in the facility OPDES permit and receive process water, cooling tower water, and storm water run-off from the landfill, coal pile, and the operational areas of the plant. Discharge from the ponds is to the Neosho River.

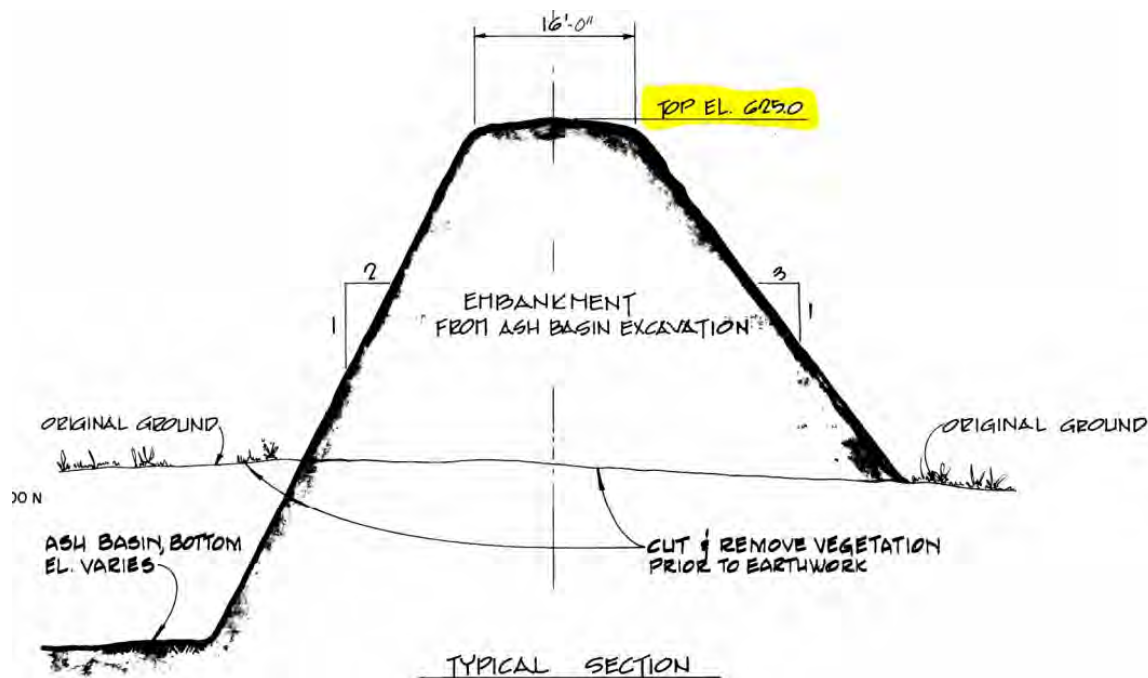


Figure 3-1 Original Design Drawing Cross-Section of Landfill Embankment

3.2 Operations

Disposal operations within the power plant require dump trucks to haul the fly ash and bottom ash from the plant to the landfill. The haul trucks are loaded from storage silos using dry disposal methods. The haul trucks unload the ash in the landfill area and dozers are used to grade the material into even lifts. A water truck is used to condition the dry ash to aid in grading and prevent fugitive dust. Currently the existing face of the disposed ash is on the north and the drainage of the exposed ash is toward the north. In general, bottom ash is deposited at the northeast corner of the current working face of the landfill area. The bottom ash has occasionally been sold as a beneficial use product, therefore bottom ash is deposited separately from the fly ash. Bottom ash has a granular/gravel texture and is also dampened with water for fugitive dust control purposes prior to loading. Once loaded, the transport vehicles then convey CCRs to the landfill for final disposal. At the landfill, water trucks are used to minimize fugitive dust as necessary. Ash material that has been placed at the planned final grade has been capped with the planned cover soil, top soil and seeded with grass. During the inspection, cover soil was being transported to the top of the landfill and graded to slope.

Final capping has been completed on the south face of the landfill and the south half of the west side. These areas have the planned cover soil, topsoil, and a good stand of vegetative cover. These slopes are mowed throughout the year.

3.3 Landfill Volume and Capacity

Based on the original construction drawings, the landfill's exterior embankment was constructed to elevation 625. CCR materials have been placed in the west 47 acres of the original permitted landfill boundary. Side slopes of the landfilled ash (ash deposited inside the embankments) have been graded at 4 horizontal to 1 vertical in compliance with the Closure Plan, dated February 22, 2018.

A recent survey evaluation of ash placement has estimated the current ash volume to be 3,750,000 cubic yards within the 47 acre footprint.

The current plan is to construct a new east embankment from north to south on the east side of the active 47 acre landfilled area. This will reduce the permit area to the current footprint of stored ash materials. Using the planned closure grades and elevations for the 47 acres, the planned capacity of the landfill area will be 4,350,000 cubic yards.

3.4 Landfill Inspection Procedures

In accordance with OAC 252:517-13-5(a)(1) the facility is inspected on a weekly basis by plant personnel. The inspections include observations of structural integrity, fugitive dust, and proper operations. The inspection findings and any required actions are recorded and presented at <https://www.grda.com/ccr-weekly-ccr-landfill-inspection-for-2020/>

The weekly inspections were initiated on October 11, 2015. The weekly inspection reports have been completed during the past year and were reviewed for this inspection.

4.0 Inspection Findings

Black & Veatch completed the annual inspection based on the requirements of OAC 252:517-13- 5(b) *Annual Inspection by a Qualified Professional Engineer*. The inspection was completed as a visual inspection with the main goals of identifying signs of distress or malfunction of the embankments and cover soils. As part of this inspection, Black & Veatch also performed a review of the available information which included the following documents;

- Coal Combustion Residual (CCR) Landfill – Stability Analysis Report, prepared by Black & Veatch, 9 July 2020.
- Grand River Dam Authority (GRDA) 490-MW Coal Fired Generating Station Ash Disposal Permit Application, Chouteau, Oklahoma; 22 August 1979.
- Oklahoma Administrative Code (OAC). Chapter 517. Disposal of Coal Combustion Residuals from Electric Utilities, Effective 15 September 2018
- Bottom Ash Surface Impoundment Hazard Potential Classification Assessment, prepared by Black & Veatch, October 2016.
- Closure Plan for GRDA Landfill – Grand River Energy Center, by A & M Engineering and Environmental Services, Inc, 22 February 2018.
- Quality Assurance and Quality Control Plan for GRDA Landfill – Grand River Energy Center, by A & M Environmental Services, 13 September 2019.
- CCR Weekly Landfill Inspection Report for 2020. grda.com/ccr-weekly-ccr-landfill-inspection-for-2020/.

Field inspection of the landfill included a site walk to observe the embankment crest, embankment slope, embankment toe, and cover soils.

4.1 Results of Inspection

4.1.1 Crest

The crest of the landfill embankments on the west and north sides are grass covered. The crest of the embankments had good grass cover, no signs of cracking, settlement, movement, erosion or deterioration. (See Figure 4-1). Mowing operations have maintained a good height for the grass and no unwanted vegetation (bushes or trees) were observed. No ruts or bare areas were observed on the crest. No depressions or slumps were observed that would indicated the beginnings of slope failure.

The crest of the embankment on the south side of the landfill had been covered with ash and the crest was not distinguishable along the side slope.



Figure 4-1 Field Photo of West Embankment, Looking North

The original permitted landfill embankments to the northeast and east have been stripped of topsoil. This soil is planned to be used as cover soil on the final grades of the CCR material.

The landfill embankment to the south and east has some overgrowth vegetation, but this embankment has never retained CCR material. The northeast, east, and southeast permitted embankments will be removed from the permitted landfill area when a new east embankment is constructed adjacent to the existing ash material.

4.1.2 Exterior Slopes - Embankment

The exterior slopes were grass covered. There were no signs of unwanted vegetative growth, new encroachments, or settlement. There were no active erosion channels along the slope. Occasional older erosion channels were observed, but were well covered with grass. The grass has prevented active erosion within the small channels. The erosion channels were not deep enough to disrupt the mowing equipment.

There were no signs of seepage or wet ground. There was no indication that some sod cover had more growth due to higher moisture contents. There were no signs of slope stability problems and no signs of depression caused by slumping ground.

Minor animal control had been noted in the weekly inspections and some rooting animal markings were observed along the southwest embankment. As stated in the weekly reports animal control measures are being implemented as problem areas are observed.

4.1.3 Exterior Slopes – CCR Material

The areas of the CCR material that have reached final grade have been capped with the planned cover soil, topsoil, and grass seed. In general the cover soil observed on the closed portion of the landfill was the same condition as the exterior slopes of the embankment. The cover material on the landfill slopes has good grass cover and has been well maintained. There were minor areas of exposed ash on the side slopes along the southeast corner of the ash pile, but those areas are easily repaired with additional cover soil, topsoil, and seeding.



Figure 4-2 Final Cover on CCR Material – South Slope - Looking West

5.0 Conclusions and Recommendations

Based on the landfill embankments and final grading of the CCR material as observed during the inspection on November 17, 2020, the landfill is considered sufficient to function as intended.

There were no signs of distress or instability problems associated with the landfill embankments or stored CCR materials.

There are no recommendations for the future of the landfill or the related structures.