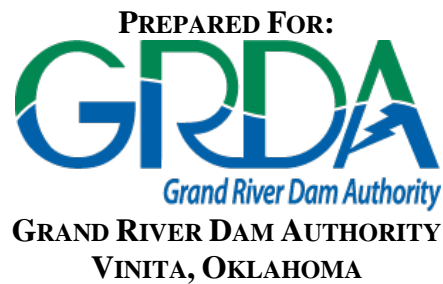


RUN-ON AND RUN-OFF CONTROL PLAN
FOR
GRAND RIVER DAM AUTHORITY LANDFILL
GRAND RIVER ENERGY CENTER
MAYES COUNTY, OKLAHOMA
SOLID WASTE PERMIT NO. 3549012



FEBRUARY 22, 2018

A&M PROJECT NO. 1986-016



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CERTIFICATION STATEMENT

I certify that this Run-on and Run-off Control Plan was prepared under my direction or supervision in accordance with Oklahoma Administrative Code (OAC) 252:517 for the GRDA Landfill located within the Grand River Energy Center complex in Mayes County, Oklahoma. Based on the information reviewed, this report is to the best of my knowledge and belief, true, accurate and complete.

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Jared T. Bates, P.E.

Oklahoma Registration No. 20681

Date



RUN-ON AND RUN-OFF CONTROL PLAN
GRAND RIVER DAM AUTHORITY LANDFILL
GRAND RIVER ENERGY CENTER
MAYES COUNTY, OKLAHOMA

1.0 INTRODUCTION

The Grand River Dam Authority (GRDA) owns and operates the Grand River Energy Center (GREC) electric generating facility located approximately three (3) miles east of the City of Chouteau in Mayes County, Oklahoma. Two (2) coal fired boilers are operated at GREC which produce Coal Combustion Residuals (CCRs) consisting of fly ash and bottom ash. Fly ash comprises greater than 80% of CCRs generated at the facility and is largely sold for beneficial use purposes. Excess fly ash and bottom ash is disposed within a permitted coal ash landfill, herein referred to as the GRDA Landfill, located within the GREC complex.

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published a final rule for the Disposal of CCRs from Electric Utilities. This new rule regulates the disposal of CCRs under 40 CFR Parts 257 and 261. The rule applies both to new and existing CCR landfills and surface impoundments at coal burning electric utility sites.

40 CFR 257.81(c)(1) requires existing CCR landfill facilities to prepare “*initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs(c)(3) and (4) of this section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator has completed the initial run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(3).*”

Oklahoma adopted the new CCR rules into code OAC 252:517, adopted February 17, 2017, approved by the Governor June 13, 2017, effective September 15, 2017.



OAC 252:517-13-2(c) states: *The owner or operator must prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this Section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable 63 requirements of this Section. Each plan must be supported by appropriate engineering calculations. The owner or operator has completed the initial run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by OAC 252:517-19-1(g)(3).*

This Run-On and Run-Off Control Plan has been prepared to satisfy the requirements of Oklahoma Administrative Code (OAC) 252:517.

2.0 LANDFILL INFORMATION

The GRDA Landfill is permitted by the Oklahoma Department of Environmental Quality (DEQ) 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 (DEQ, 2015). The GRDA Landfill is situated south of the coal fired boiler units within the GREC complex and has been in operation since 1981. The total landfill permit area consists of approximately 67 acres, of which only 47 acres have been utilized for CCR disposal and remains active to date.

2.1 DESIGN AND CONSTRUCTION HISTORY

Prior to permit issuance and construction, it was established through the performance of geotechnical investigations and testing that the landfill site was underlain by an impermeable clay layer that ranged in thickness from 11 to 23 feet across the site (Holway-United, 1979). The landfill was initially established by constructing a perimeter dike around a 70 acre portion of the permitted landfill area as shown in **Figure 1**.

The perimeter dikes were constructed of native clay soils from the site. Approved grading plans for the site indicate that the exterior slopes of the perimeter dike was designed to range between



3 feet Horizontal to 1 foot Vertical (3:1) and 2.5:1 while the interior slopes were designed to range between 2:1 and 2.5:1 (Holway-United, 1979).

The landfill was designed so that all surface water drainage is routed around and/or away from the landfill area. Current site drainage patterns are shown in **Figure 2**. Minimal watershed areas impact the outer perimeter of the landfill as the general site topography promotes drainage away from the perimeter of the landfill, especially on the south, east and west sides of the landfill. The majority of surface water on the north side of the landfill naturally drains around the landfill in a direction parallel to the perimeter dike to natural drainages within the site. Potential run-on is controlled primarily by the perimeter landfill dike which ranges in height from 3 to 30 feet above the surrounding topography. On the north and east sides of the landfill, drainage ditches also help convey potential run-on flow around the perimeter dike of the landfill.

On the western and southern sides of the landfill diversion channels are not required because the topography promotes drainage away from the perimeter of the landfill and directly into a series of permitted Class III industrial wastewater treatment impoundments regulated by an Oklahoma Pollutant Discharge Elimination System (OPDES) permit. The industrial wastewater system consists of eleven (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.

2.2 OPERATIONAL METHODS

General operational activities employed at the GRDA Landfill include the transportation and placement of CCRs in the landfill; general maintenance of the landfill; and installation of soil cover as necessary.

CCR material to be disposed at the landfill is transferred from storage silos to transport vehicles utilizing dry loading methods. During loading, fly ash is moisture conditioned for the purposes of fugitive dust control and compaction in the landfill (GRDA, 2015). Bottom ash has a



granular/gravel texture and is also dampened with water for fugitive dust control purposes prior to loading (GRDA, 2015). 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. Application of daily soil cover is not generally necessary for the conditions at this landfill.

As design top of waste elevations are achieved, GRDA has applied either final or intermediate soil cover to the exterior landfill slopes and has established vegetation in order to minimize water infiltration into the landfill and reduce erosion and transport of soils and/or CCR materials from the landfill. Side slopes are regularly mowed, monitored and maintained. Precipitation run-off from the exterior slopes is collected within the wastewater impoundments around the landfill. Precipitation run-off from the active landfill area is collected within the permitted landfill area and drained into the industrial wastewater treatment system.

3.0 RUN-ON CONTROLS

OAC 252:517-13-2(a) requires existing CCR landfill facilities to design, construct, operate and maintain a run-on control system to prevent the flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm event. In order to verify that the landfill complies with the run-on control system requirements, drainage calculations were performed assuming a 25-year, 24-hour storm precipitation of 6.76 inches, based on the current National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server (PFDS). Drainage calculations are provided in **Appendix A**. The perimeter dike prevents any potential peak run-on flow from a 24-hour, 25-year storm event from entering the active portion of the landfill.

4.0 RUN-OFF CONTROLS

OAC 252:517-13-2(a) requires existing CCR landfill facilities to design, construct, operate and maintain a run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm. Run-off from the capped portions of the CCR unit is designed to run along diversion dikes along the slope of the cap, and subsequently down a rock letdown channel to surface impoundment or basin. The wastewater



treatment system handles process water and storm water from the operational areas of the plan, including the landfill, and is regulated by an OPDES permit. The drainage basin along the eastern boundary flows through a culvert to an existing surface impoundment.

In accordance with OAC 252:517-13-2(b), run-off is managed in a manner consistent with the surface water requirements of OAC 252:517-13-6.

5.0 PLAN AMENDMENTS

In accordance with OAC 252:517-13-2(c)(2), GRDA may amend this written Run-On and Run-Off Control Plan at any time provided the revised plan is placed in the facility's operating record as required by OAC 252:517-19-1(g)(3). GRDA is required to amend this written Run-On and Run-Off Control Plan whenever there is a change in conditions that would substantially affect the written plan in effect.

6.0 PLAN REVISIONS

In accordance with OAC 252:517-13-2(c)(4), GRDA must prepare periodic Run-On and Run-Off Control Plan at least once every five (5) years. The deadline for completion of the first periodic Run-On and Run-Off Control Plan is five (5) years from the date of this initial Plan.

7.0 RECORDKEEPING REQUIREMENTS

In accordance with OAC 252:517-13-2(d), GRDA must maintain this Run-On and Run-Off Control Plan in the facility operating record. Unless specified otherwise, each file must be retained for at least five (5) years following the date of each occurrence, measurement, maintenance, corrective action, report, record, or study.

8.0 NOTIFICATION REQUIREMENTS

In accordance with OAC 252:517-13-2(c)(6), the DEQ Land Protection Division must be notified when this document or any subsequent amendments or revisions to this document are



placed in the operating record and on the publicly accessible internet site. DEQ must approve the run-on and run-off control system plans and subsequent amendments.

9.0 CCR WEBSITE REQUIREMENTS

In accordance with OAC 252:517-19-3(c), GRDA must maintain this Run-On and Run-Off Control Plan on the corporate “CCR Rule Compliance Data and Information” webpage. Unless otherwise required, the information required to be posted to the CCR Website must be made available to the public for at least five (5) years following the date on which the information was first posted.

In accordance with OAC 252:517-19-3(d), GRDA must post the required information to the “CCR Rule Compliance Data and Information” webpage within 30 days of placing the pertinent information required by OAC 252:517-19-1 into the facility operating record.

10.0 REFERENCES

Holway-United, *Grand River Dam Authority 490-MW Coal-Fired Generating Station Ash Disposal Site Permit Application, Chouteau, Oklahoma.* August 22, 1979.

Oklahoma State Department of Health (OSDH), *Permit for a Coal Ash Disposal Site.* January 13, 1981.

Oklahoma Department of Environmental Quality (DEQ), *Permit Modification to add an additional Solid Waste Stream, Grand River Dam Authority, Mayes County, Permit 3549012.* February 20, 2015.

United States Environmental Protection Agency (USEPA), *40 CFR Part 257, Subpart D.* April 17, 2015.

State of Oklahoma, Oklahoma Department of Environmental Quality (ODEQ), *OAC 252:517 Disposal of Coal Combustion Residuals from Electric Utilities,* September 15, 2017



Grand River Dam Authority (GRDA), *Coal Combustion Residual Fugitive Dust Control Plan for Grand River Energy Center*. October 2015



Appendix A
Drainage Calculations