



ANNUAL INSPECTION REPORT
GERALD GENTLEMAN STATION

ANNUAL INSPECTION REPORT GERALD GENTLEMAN STATION ASH DISPOSAL FACILITY

Submitted To: Nebraska Department of Environmental Quality
Waste Management Section
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Nebraska Public Power District
"Always there when you need us"

Submitted By: Nebraska Public Power District
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1.0 INTRODUCTION AND BACKGROUND

Gerald Gentleman Station (GGS) is a coal-fired electrical generation facility owned and operated by Nebraska Public Power District (NPPD). The plant, which is capable of generating 1,365 MW of power, uses a Type C low-sulfur coal from Wyoming's Powder River Basin. Fly ash and bottom ash are the two products of coal combustion at GGS. The majority of the bottom ash is sold; thus, fly ash is the primary product placed in the site's ash disposal facility. Based on data from 2009 to 2014, GGS generates approximately 219,000 tons of fly ash each year. Of that total, approximately 96,000 tons are sold annually, and approximately 123,000 dry tons are placed in the ash disposal facility each year. As of the 2014 operating permit (Nebraska Department of Environmental Quality (NDEQ) Permit No. NE0203254), the estimated remaining capacity at Ash Landfill Nos. 1, 2, 3, and 4 and the bottom ash disposal area is 6.2 million cubic yards. Ash will be placed in eight phases over a period of approximately 72 years, based current ash disposal rates.

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published the final Coal Combustion Residuals (CCR) Rule in the Code of Federal Regulations. The CCR Rule was published under 40 CFR Part 257 of the Subtitle D solid waste provisions under the Resource Conservation and Recovery Act (RCRA). This report has been prepared consistent with the annual inspection requirements for CCR landfills under Part 257.84. The following sections present the findings of the initial inspection of the ash disposal facility performed between August and November of 2015.



2.0 REVIEW OF EXISTING INFORMATION

2.1 Previous Inspection Reports

This is the first P.E. inspection of the ash disposal facility as per USEPA regulation 40 CFR part 257.84 (b) requirements. Therefore, no previous inspection reports were available in the operating record at the time of the P.E. inspection.

2.2 Liner System

Fly ash is currently disposed at Ash Landfill No. 4. The general liner design at Ash Landfill No. 4 consists of 60-mil high density polyethylene (HDPE) geomembrane over compacted subgrade. Prior to geomembrane installation, the existing subgrade was scored to a depth of 6 inches minimum and compacted to 95 percent of its maximum dry density (standard Proctor). Smooth HDPE geomembrane was placed on the bottom of the ash landfill, and textured HDPE geomembrane was placed on the side slopes. Construction quality assurance (CQA) for the geomembrane installation was performed by Golder Construction Services and completed on November 15, 1994. There is no Leachate Collection System (LCS) at Ash Landfill No. 4.

Ash Landfill No. 3 was previously closed in 1995 with 2 to 7.5 feet of soil cover. This cover was removed and the area was re-lined in 2015. The new liner system at Ash Landfill No. 3 consists of a prepared subgrade overlain by a geosynthetic clay liner (GCL) and 60 mil linear low-density polyethylene (LLDPE) geomembrane. Ash Landfill No. 3 also has a one foot LCS sand layer, with 4-inch HDPE LCS piping reporting to sumps. Construction of the new permitted Ash Landfill No. 3 liner system was completed in November, 2015.

Typically less than 500 tons of bottom ash per year are placed on a prepared subgrade in the bottom ash disposal area.

2.3 Final Cover

Final cover was placed on a portion of the south slope of Ash Landfill No. 4 during construction of Phase 2 of the ash disposal facility in 2015. The final cover design at Ash Landfill No. 4 is consistent with the operating permit, and is comprised of two feet of growth medium soil.

2.4 Water Management

Stormwater and contact water are managed at the ash disposal facility. Stormwater is water that does not come into contact with ash, and water that comes into contact with ash is classified as contact water. Water management methods are presented in the following sections.



2.4.1 Stormwater

Stormwater that falls outside the landfill footprint is diverted away from the ash disposal area by soil berms to prevent contact with fly ash. Stormwater is shed from the area towards natural surface water draws located north and south of the landfill.

Perimeter berms and terrace channels have been constructed on the final cover slope to control stormwater and limit erosion of the final cover soils. The perimeter berms and terrace channels divert stormwater to a downchute channel that is lined with articulated concrete block. The downchute channel discharges to a hydraulic jump basin, which then directs stormwater to a natural drainage south of the landfill.

2.4.2 Contact Water

Contact water includes stormwater falling within the landfill and leachate as defined in Title 132 of the Nebraska Administrative Code. Contact water is managed within the lined footprint. Ash is placed to promote contact water on the surface of the ash to flow from the landfill perimeter toward the east end of the landfill, to the designated contact water control pond. The contact water pond is managed to keep adequate freeboard – typically over five feet of freeboard.

The new liner system at Ash Landfill No. 3 includes an LCS. Water collected from the LCS during active ash placement will be pumped back into the active footprint where it will drain to the lined contact water evaporation pond. Modeling of the system indicates that a minimal amount of water will report to the LCS once the ash facility has received sufficient ash to cover the footprint. After closure, water that is collected in the LCS will be pumped to either lined evaporation ponds or pumped to trucks for disposal or treatment.

The geometry of the bottom ash disposal area contains contact water within the facility.



3.0 2015 ANNUAL INSPECTION

Jacob Sauer, Nebraska P.E. (E-15119), of Golder performed an inspection of the ash disposal facility as per USEPA regulation 40 CFR part 257.84 (b) requirements. The inspection consisted of a site reconnaissance by walking around the crest of the perimeter berm combined with observing outer embankment slopes. Photographs were taken and are presented in Appendix A. An annual inspection checklist used during the inspection is presented in Appendix B. The following presents a summary of the observations made during the 2015 annual inspection.

3.1 Changes in Geometry

The geometry of the ash disposal facility was found to be in general conformance with the design. Ash disposal grades, outer embankment slopes, contact water channels were observed to be consistent with the permitted design. Unexpected changes in geometry such as sloughing or differential settlement were not found during the site inspection.

3.2 Volume of CCR

The sources and materials deposited at the ash disposal facility consist of fossil fuel combustion ash, defined pursuant to Title 132. Coal fly ash from GGS is the predominant type of ash placed in the ash landfills. The daily quantity of fly ash placed varies due to generation levels and marketing. Based on GGS data from 2009 to 2014, approximately 219,000 tons of fly ash is produced annually at GGS. On average, the amount of fly ash sold each year is 96,000 tons, and approximately 123,000 dry tons are placed in the ash landfills annually. Since the beginning of 2009, approximately 617,000 dry tons of fly ash have been placed into Ash Landfill No. 4, and approximately 478,000 tons of fly ash have been sold for beneficial use. Nebraska Public Power District will continue to maximize the marketing of fly ash versus on-site placement.

A nominal amount of bottom ash (<500 tons/year) is placed in the bottom ash disposal area north of Ash Landfill No. 3. From 2009 to 2014, approximately 183,400 tons of bottom ash were sold for beneficial use. The majority of bottom ash is sold; thus fly ash is the primary product placed at the site's ash disposal facility.

3.3 Signs of Structural Weakness

Signs of structural weakness were not observed during the site inspections between August and November of 2015.



3.4 Other Observations That Could Affect Stability

3.4.1 Burrowing Animals

Evidence of burrowing animals was observed both along the top of the perimeter road (primarily small rodent holes) and at the toe of the outer slopes (likely badger holes), primarily on the opposite side of the drainage from the disposal facility. NPPD inspects the embankments weekly, and signs of burrowing animals are documented. Animal burrows on the embankment slopes are addressed and repaired as necessary.

3.4.2 Erosion

Minor erosional gullies were observed on the outer embankment slopes. NPPD has repaired many of the erosion gullies with soil fill, but vegetation has not yet taken hold in the repaired areas. Erosion of the exterior slopes should be monitored and NPPD should continue to perform routine maintenance on the slopes. NPPD should notify Golder of areas that are frequently eroded so that appropriate surface water controls can be developed.



4.0 CLOSING

An annual inspection was performed for the ash disposal facility at Gerald Gentleman Station between August and November, 2015. The inspection met the requirements for CCR landfills under CFR Part 257.84. The inspection found no indication of any major structural deficiencies. Minor maintenance items that will need to be continually addressed include burrowing animals, erosion and vegetative growth of exterior slopes, and removal of any woody vegetation growing on exterior slopes.

We appreciate the opportunity to provide NPPD with assistance related to the ash disposal facility at Gerald Gentleman Station. Please let us know if you have any questions or need additional support.

Sincerely,

GOLDER ASSOCIATES INC.

Jacob Sauer, PE
Senior Project Engineer

Ron Jorgenson
Principal and Senior Practice Leader





5.0 REFERENCES

Nebraska Public Power District and Golder Associates Inc., 2014. Renewal Application, Permit No. NE0203254, Gerald Gentleman Station, Ash Disposal Facility, May 16, 2014.

**APPENDIX A
INSPECTION PHOTOS**



Project Title: Ash Disposal Facility Annual Inspection, Gerald Gentleman Station

PHOTO 1

Recently repaired exterior embankment slope.



PHOTO 2

Vegetation on south embankment slope.





PHOTO 3

Vegetation on the east slope of the disposal facility (looking south).



PHOTO 4

Vegetation on the east slope of the disposal facility (looking north).





PHOTO 5

Bottom ash disposal area.



PHOTO 6

Contact water storage area.





PHOTO 7

Perimeter road and contact water containment berm on north side of facility.



PHOTO 8

Animal burrow on south embankment.





PHOTO 9

Center pivot for dust control on top of Ash Landfill No. 4.



PHOTO 10

South slope of Ash Landfill No. 4 after partial final cover placement and downchute channel construction.



**APPENDIX B
2015 ANNUAL INSPECTION FORM**



Nebraska Public Power District

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**NEBRASKA PUBLIC POWER DISTRICT
GERALD GENTLEMAN STATION
ASH DISPOSAL FACILITY
ANNUAL INSPECTION**

Date of Observations Multiple Dates September-November, 2015		Legend: Y Yes N No NI Not Inspected NA Not applicable RA Requires action
Inspector: Jacob Sauer, PE - Golder	Title: Senior Project Engineer	

Please mark areas of concern on the attached plan view of the facility. Insert comments in Section G.

A. Area Status

Status of Disposal Area	Active		Inactive			Closed
If inactive, how long inactive?	NA					days/months
If greater than 180 days, is interim cover being placed and/or seeded?	Y	N	NI	NA	RA	No inactive areas so interim cover is not required in the Engineering Design and Operations Plan
Any changes to the utilities near or servicing the area?	Y	N	NI	NA	RA	Overhead power lines that historically ran through Ash Pit No. 4 have been re-routed. Power and water feeding the center pivot used for dust control have been modified.

B. Facility Access

Do all entrances have signs detailing entrance authorization and allowed disposal material?	Y	N	NI	NA	RA	
Are the roads to the site in good repair?	Y	N	NI	NA	RA	
How is access controlled to the site (fencing, locked gate, etc.)?	Fence with gate. Main access is in front of GGS security building. Gate is typically left open.					
Are the facility boundaries clearly marked?	Y	N	NI	NA	RA	
Are there signs of unauthorized access to the site such as trails or gaps in the fencing?	Y	N	NI	NA	RA	
Is there any evidence of any unauthorized disposal (other than CCPs or construction/demolition debris)?	Y	N	NI	NA	RA	

C. Site Conditions

Are there signs of erosion in the disposal area such as gullies, dirt flows, etc.?	Y	N	NI	NA	RA	There are minor erosion rills on the fly ash slopes within Ash Pit No. 4. The contact water and fly ash sediment are contained within the lined footprint.
Are there signs of differential settlement in the disposal area such as cracks, sinkholes, etc.?	Y	N	NI	NA	RA	

Any indication of vegetative stress in or near the disposal area? Are there pockets of dead or dying vegetation in otherwise seeded areas?	Y	N	NI	NA	RA	There are several locations where NPPD has repaired erosion on closed slopes and vegetation has not yet been successfully re-established. These areas should be monitored and re-seeded as necessary.
Any noticeable environmental concerns such as: odor, excessive dust or litter, discolored earth or water, infestation by animals, signs of open burning?	Y	N	NI	NA	RA	Dust should continue to be controlled with the center pivot and water trucks. Large burrowing animals (ie. badgers) should be managed when they appear in the outer slopes.
Is there any evidence of spillage or disposal outside of the immediate disposal area?	Y	N	NI	NA	RA	
Is water ponding within the facility?	Y	N	NI	NA	RA	Contact water is managed within the lined facility per the design.
Is there at least two feet of freeboard within the ash disposal facility?	Y	N	NI	NA	RA	Freeboard in the contact water management pond in the east side of Ash Pit No. 4 is at least 6 feet.
D. Water Control Structures						
Is there any erosion or blockage of the diversion channels?	Y	N	NI	NA	RA	
Are temporary erosion controls in place? Describe.	Y	N	NI	NA	RA	Silt fence is in place around the perimeter of Ash Pit No. 3 for construction of the new phase of the ash disposal facility.
Are all surface water control structures and monitoring devices in good condition?	Y	N	NI	NA	RA	Silt fence condition should be monitored after rain events.
Are all monitoring wells in good condition?	Y	N	NI	NA	RA	
Any signs of off-site migration of the contact water?	Y	N	NI	NA	RA	
Note the condition of any special features.	New downchute channel on south side of Ash Pit No. 4 is in good condition.					
E. Structural Stability						
Any signs of seepage on the downstream face of the embankments? (Signs of wetness, gullies, erosion features)	Y	N	NI	NA	RA	
Any signs of mass movement such as differential settlement within the impoundment or crest elevation changes along the centerline of the embankment?	Y	N	NI	NA	RA	
Any signs of sudden change in the liquid levels within the impoundment?	Y	N	NI	NA	RA	
Any signs of external impacts that may affect the liner integrity or embankment stability for the facility?	Y	N	NI	NA	RA	Woody vegetation found on exterior slopes. Tree seedlings should be removed by plant personnel.
F. Pumps, Pipelines, and Distribution Systems						
Any signs of wetness above buried pipelines or below aboveground pipelines indicating possible leaks or stressed areas of piping?	Y	N	NI	NA	RA	
On any above ground pipeline, does the foundation appear unmoved and stable?	Y	N	NI	NA	RA	

Are the pumps currently operational, and, if so, in apparent good working order?	Y	N	NI	NA	RA	
G. Facility Overview						
What material is currently being placed at the facility?	Fly ash and bottom ash					
Any housekeeping concerns about the waste placement, coverage, and vegetation for visitors and neighbors?	Gaps in vegetation on external slopes should be addressed. Recommend re-seeding as soon as practical.					
Is partial closure of the facility occurring?	Y	N	NI	NA	RA	The south side of Ash Pit No. 4 received final cover in 2015.
Has seed and mulch been applied on the closed areas of the site?	Y	N	NI	NA	RA	The south side of Ash Pit No. 4 was seeded in 2015.
Any visible or exposed soil or geomembrane liner?	Y	N	NI	NA	RA	A small area of sacrificial geomembrane was exposed in the access to the contact water pond on the east side of Ash Pit No. 4. The area has been covered by NPPD.
Were the concerns from the last annual observation addressed and corrected?	Y	N	NI	NA	RA	This was the initial annual observation.
H. Comments						
<p><i>Describe <u>any</u> concerns identified above along with an overview of the current operations occurring at the facility. Include documentation of corrective action measures (photographs, plan view map, sketches, etc.) along with any work orders and anticipated dates of completion.</i></p> <p>See Annual PE Inspection Report dated January 5, 2016.</p>						