



ANNUAL INSPECTION REPORT

GERALD GENTLEMAN STATION

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2017 ANNUAL INSPECTION REPORT GERALD GENTLEMAN STATION ASH DISPOSAL FACILITY

Submitted To: Nebraska Department of Environmental Quality
Waste Management Section
1200 "N" Street
P.O. Box 98922
Lincoln, Nebraska 68509-8922



Nebraska Public Power District

"Always there when you need us"

Submitted By: Nebraska Public Power District
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January 5, 2018

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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 (see Figure 1). Based on data from 2015, GGS generates approximately 226,300 tons of fly ash each year. Of that total, approximately 143,700 tons has historically been sold annually, and approximately 82,600 dry tons were placed in the ash disposal facility each year. For 2017, significantly more fly ash has been marketed, resulting in just approximately 2,400 tons being placed in the disposal facility through the end of October. 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 105 years, based on 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 to be consistent with the annual inspection requirements for CCR landfills under Part 257.84. The following sections present the findings of the second annual inspection of the ash disposal facility performed on October 16, 2017.



2.0 REVIEW OF EXISTING INFORMATION

2.1 Previous Inspection Reports

This is the third Professional Engineer (P.E.) inspection of the ash disposal facility as per USEPA regulation 40 CFR part 257.84 (b) requirements. Previous inspections did not find signs of structural weakness or changes in geometry. The 2016 inspection report noted only minor areas for improvement, including:

- Erosion on exterior slopes;
- Animal burrows on exterior slopes; and
- Areas of poor vegetative growth.

NPPD also performs weekly inspections of the ash disposal facility. Observations from the weekly inspections are recorded on the inspection forms, which are maintained in the site operating record. The 2017 weekly inspection forms reported the following notable observations and activities:

- Trapping and removal of three badgers from the area of the ash disposal facility.
- Extents of contact water ponding within the lined footprint.
- Location of ash deposition.
- Maintenance of embankment and final cover slopes.

2.2 Liner System

Fly ash is currently disposed at Ash Landfill No. 4 and in the east cell of Ash Landfill No. 3. The 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 1-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.



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 2 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 5 feet of freeboard.

The new liner system at Ash Landfill No. 3 includes an LCS. Water collected from the LCS during active ash placement may be pumped back into the active footprint where it will drain to the lined contact water evaporation pond on the east side of Ash Landfill No. 4. 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.



3.0 2017 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. The annual inspection also included discussions with NPPD staff and review of their weekly inspection reports and observations. Photographs were taken and are presented in Appendix A. An inspection checklist used during the inspection is presented in Appendix B. The following presents a summary of the observations made during the 2017 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, and 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 2015, approximately 226,300 tons of fly ash is produced annually at GGS. On average, the amount of fly ash sold each year is 143,700 tons, and approximately 82,600 dry tons are placed in the ash landfills annually. Demand for fly ash was up significantly again in 2017, and the amount of fly ash placed in the ash landfill was down appreciably from the historic averages, with an estimated 2,400 tons of fly ash placed through October. NPPD 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. Through October 2017, approximately 15 tons of bottom ash were placed in the disposal facility. 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 October 16, 2017 site inspection.

3.4 Other Observations That Could Affect Stability

3.4.1 Burrowing Animals

Some 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). The number of animal burrows



observed was consistent with the 2016 inspection, and has been reduced significantly from the 2015 inspection. NPPD inspects the embankments weekly, and signs of burrowing animals are documented. Animal burrows on the embankment slopes are addressed and repaired as necessary. NPPD trapped and relocated three badgers in 2017.

3.4.2 Erosion

Minor erosion was observed on the outer embankment slopes on the west and south sides of Ash Landfill No. 3 and the south side of Ash Landfill No. 4. Erosion of the exterior slopes should be monitored and NPPD should continue to perform routine maintenance on the slopes. NPPD should address areas that are frequently eroded so that appropriate surface water controls can be developed.

Vegetative growth of the final cover placed in 2015 has improved, resulting in reduced erosion of the cover soil. The terrace channels and downchute channel on the final cover appear to be functioning as designed.

3.5 Vegetation

A significant number of cottonwood seedlings have developed inside of Ash Landfill No. 3. At present, the seedlings are not large enough to cause issues with the liner system or impact stability, but NPPD should consider addressing the cottonwoods, preferably within the next six months.



4.0 CLOSING

An annual inspection was performed for the ash disposal facility at Gerald Gentleman Station on October 16, 2017. The inspection met the requirements for CCR landfills under CFR Part 257.84. The inspection found no indication of major structural deficiencies. Minor maintenance items that should be addressed include burrowing animals, erosion, cottonwood growth within Ash Landfill No. 3, and vegetative growth of 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,

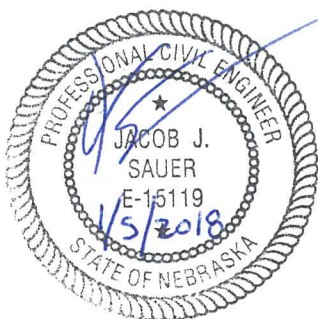
GOLDER ASSOCIATES INC.



Jacob Sauer, PE
Senior 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.

Nebraska Public Power District and Golder Associates Inc., 2016. Annual Inspection Report – Gerald Gentleman Station Ash Disposal Facility, January 11, 2016.

APPENDIX A
INSPECTION PHOTOS



Ash Disposal Facility Annual Inspection, Gerald Gentleman Station

PHOTO 1

West outer
slope of Ash
Landfill No. 3.





PHOTO 2

Center pivot in
west cell of
Ash Landfill
No. 3.





PHOTO 3

Ponded non-contact water in west cell of Ash Landfill No. 3.





PHOTO 4

Animal burrow
on south side
of Ash Pit No
3.





PHOTO 5

Fly ash
deposition in
east cell of Ash
Landfill No. 3.





PHOTO 6

West edge of
final cover on
Ash Landfill
No. 4.





PHOTO 7

Sparse
vegetation on
south slopes of
Ash Landfill
No. 3.





PHOTO 8

Perimeter road
south of Ash
Landfill No. 4.





PHOTO 9

Downchute
channel south
side of Ash
Landfill No. 4.





PHOTO 10

Contact water pond.





PHOTO 11

Active
deposition area
in Ash Landfill
No. 4.



PHOTO 12

Animal burrow
on south side
of Ash Landfill
No. 4.





PHOTO 13

Center pivot
control
building.



PHOTO 14

Sump area in
east cell of Ash
Landfill No. 3.



APPENDIX B
2016 ANNUAL INSPECTION FORM



Nebraska Public Power District

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

Date of Observations Monday, October 16, 2017

Inspector: Jacob Sauer P.E.

Title: Senior Engineer

Legend: Y Yes
N No
NI Not Inspected
NA Not applicable
RA Requires action

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

A. Area Status

Status of Disposal Area	<u>Active</u>			Inactive			Closed
If inactive, how long inactive?				<u>NA</u>			days/months
If greater than 180 days, is interim cover being placed and/or seeded?	Y	N	NI	<u>NA</u>	RA		
Any changes to the utilities near or servicing the area?	<u>Y</u>	N	NI	NA	RA	New overhead power & pump building	

B. Facility Access

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

C. Site Conditions

Are there signs of erosion in the disposal area such as gullies, dirt flows, etc.?	<u>Y</u>	N	NI	NA	RA	Minor erosion rills were observed on the east side of the AP4 deposition area.	
Are there signs of differential settlement in the disposal area such as cracks, sinkholes, etc.?	Y	<u>N</u>	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?	<u>Y</u>	N	NI	NA	RA	There is an area on the south slope between AP3 and AP4 that should be re-vegetated (see Figure). Vegetation on the outer slopes on the west side of AP3 has not been completely established and this area should be monitored	

Any noticeable environmental concerns such as: odor, excessive dust or litter, discolored earth or water, infestation by animals, signs of open burning?	Y	<u>N</u>	NI	NA	RA	The disposal area does not have signs of animal infestation, but there are several small burrows that should be monitored.
Is there any evidence of spillage or disposal outside of the immediate disposal area?	Y	<u>N</u>	NI	NA	RA	
Is water ponding within the facility?	<u>Y</u>	N	NI	NA	RA	Contact and non-contact water are ponded as designed.
Is there at least two feet of freeboard within the ash disposal facility?	<u>Y</u>	N	NI	NA	RA	
D. Water Control Structures						
Is there any erosion or blockage of the diversion channels?	Y	<u>N</u>	NI	NA	RA	
Are temporary erosion controls in place? Describe.	<u>Y</u>	N	NI	NA	RA	Silt fence is in good condition.
Are all surface water control structures and monitoring devices in good condition?	<u>Y</u>	N	NI	NA	RA	There is some erosion on the west side of the rip-rap drainage outlet in the west cell of AP4 that should be corrected.
Are all monitoring wells in good condition?	<u>Y</u>	N	NI	NA	RA	
Any signs of off-site migration of the contact water?	Y	<u>N</u>	NI	NA	RA	
Note the condition of any special features.	Sump risers are in good condition. The new center pivots at AP3 are not yet operational.					
E. Structural Stability						
Any signs of seepage on the downstream face of the embankments? (Signs of wetness, gullies, erosion features)	Y	<u>N</u>	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	<u>N</u>	NI	NA	RA	
Any signs of sudden change in the liquid levels within the impoundment?	Y	<u>N</u>	NI	NA	RA	
Any signs of external impacts that may affect the liner integrity or embankment stability for the facility?	Y	<u>N</u>	NI	NA	RA	
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	<u>N</u>	NI	NA	RA	
On any above ground pipeline, does the foundation appear unmoved and stable?	<u>Y</u>	N	NI	NA	RA	
Are the pumps currently operational, and, if so, in apparent good working order?	<u>Y</u>	N	NI	NA	RA	The AP3 center pivot is not yet operational. NPPD plans to get a Flygt pump for dewatering the AP3 contact water area.
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?	No housekeeping issues were observed.					
Is partial closure of the facility occurring?	<u>Y</u>	N	NI	NA	RA	
Has seed and mulch been applied on the closed areas of the site?	<u>Y</u>	N	NI	NA	RA	
Any visible or exposed soil or geomembrane liner?	Y	<u>N</u>	NI	NA	RA	
Were the concerns from the last annual observation addressed and corrected?	<u>Y</u>	N	NI	NA	RA	
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>						



Notes: