



REPORT

2020 Annual Inspection Report

Gerald Gentleman Station Ash Disposal Facility

Submitted to:

Nebraska Public Power District

Gerald Gentleman Station

6089 South Highway 25, Sutherland, Nebraska 69165

Submitted by:

Golder Associates Inc.

7245 West Alaska Drive, Suite 200, Lakewood, Colorado 80226

+1 303 980-0540

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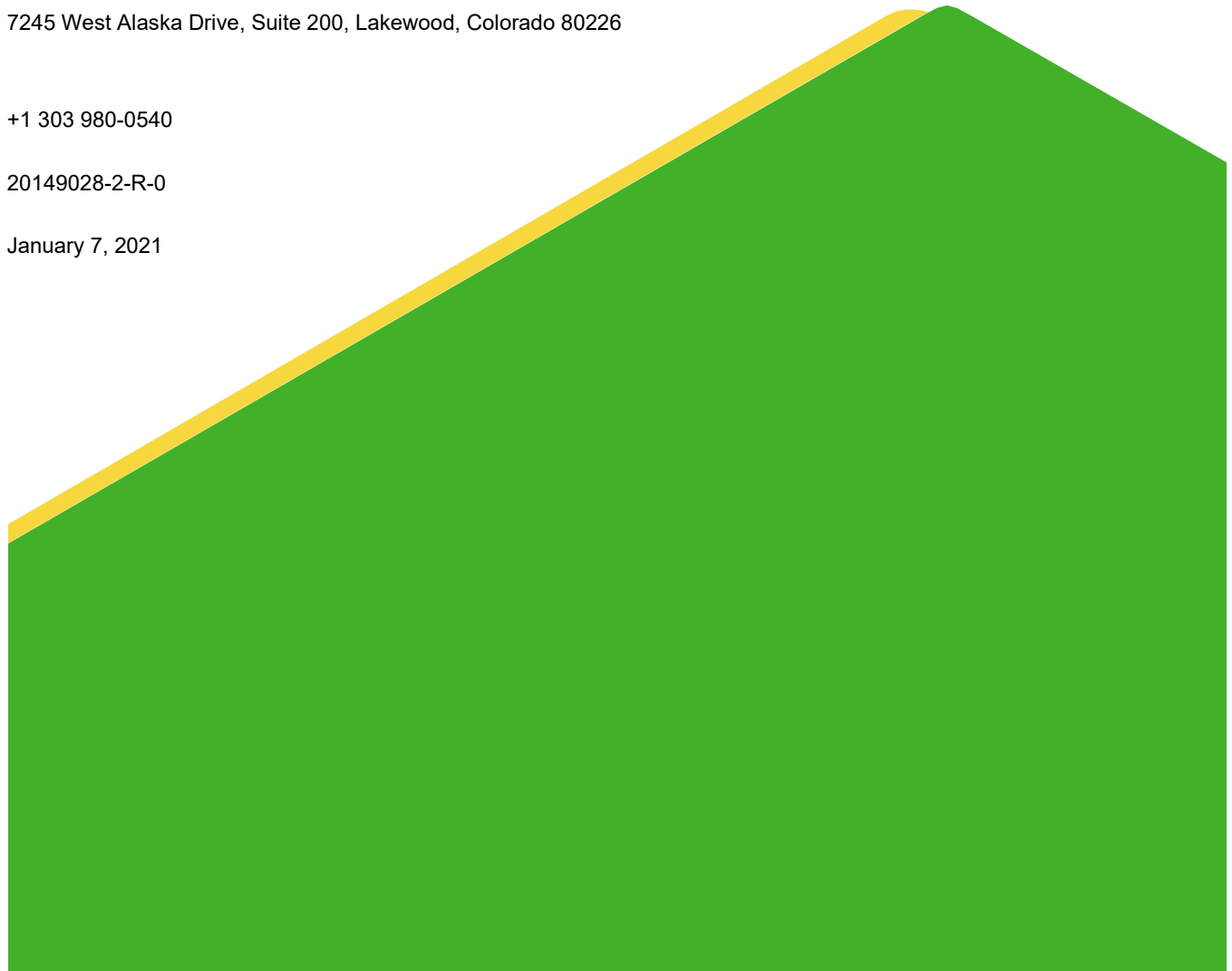


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1.0 INTRODUCTION AND BACKGROUND

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).

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. 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 from the annual inspection of the ash disposal facility performed on November 18, 2020.

2.0 REVIEW OF EXISTING INFORMATION

2.1 Previous Inspection Reports

This is the sixth Professional Engineer (PE) 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 2019 inspection report (NPPD and Golder 2019) noted only minor areas for improvement, including:

- Erosion on exterior slopes
- One small pine tree on the northeast exterior slope of Ash Landfill No. 4
- Animal burrows on exterior slopes

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 2020 weekly inspection forms reported the following notable observations and activities:

- Erosion on west slope of Ash Landfill No. 3
- Saplings within lined footprint of Ash Landfill No. 3 (removed)
- Locations of ash deposition and ponded water
- Identification of animal burrows and maintenance

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 system 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 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 and 60-mil linear low-density polyethylene geomembrane. Ash Landfill No. 3 also has a 1-foot-thick 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.

The Bottom Ash Landfill was closed, and final cover was installed over the area in 2018. The final cover system consisted of an 18-inch-thick infiltration layer (permeability less than 1×10^{-5} cm/sec) overlain by a 6-inch-thick erosion layer (topsoil). The cover was seeded and mulched to establish vegetation. The final cover system was consistent with the site operating permit and the CCR Rule. Bottom ash handling has been moved to the east side of Ash Landfill No. 4.

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; 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 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 flow on the surface of the ash from the landfill perimeter toward the east end of Ash Landfill No. 4, to the designated contact water storage area. The contact water storage area is managed to keep adequate freeboard (typically greater than 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 storage area 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 lined evaporation ponds or pumped to trucks for disposal or treatment.

3.0 2020 ANNUAL INSPECTION

Jacob Sauer, Nebraska PE (E-15119), of Golder, performed an inspection of the ash disposal facility as per USEPA regulation 40 CFR Part 257.84 (b) requirements on November 18, 2020. The inspection consisted of a site reconnaissance around the crest and toe of the perimeter berms, active deposition areas, final cover, and 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 sections provide a summary of the observations made during the 2020 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 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 of the Nebraska Administrative Code. 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 ash marketing.

Based on data from 2014-2018 (NPPD and Golder 2019), GGS generates an average of approximately 198,400 tons of fly ash each year. Of that total, on average approximately 154,700 tons have historically been sold annually, and approximately 43,700 dry tons were placed in the ash disposal facility each year. Ash generation was down in 2020 compared with recent years. GGS generated approximately 133,500 tons of fly ash and 18,300 tons of bottom ash from January 1, 2020 through October 31, 2020. Of this amount, 3,100 tons of fly ash were disposed of in the ash disposal facility. No bottom ash was permanently disposed on-site in 2020. The projected ash disposal rate moving forward is 92,500 cubic yards (cy) per year (or 135,000 tons per year based on a density of 1.46 ton/cy). The current estimated remaining capacity at the facility is 5.3 million cy. Ash will be placed in seven phases over a period of approximately 57 years.

The total estimated amount of ash placed to date in the active areas of the ash disposal facility (Ash Landfill Nos. 3 and 4) is approximately 3 million cubic yards.

3.3 Signs of Structural Weakness

Signs of structural weakness were not observed during the November 18, 2020 inspection.

3.4 Other Observations That Could Affect Stability

3.4.1 Burrowing Animals

Minor evidence of burrowing animals was observed along the south and west outer slopes of Ash Landfill No. 3 (likely badger holes). Fewer animal burrows were observed compared with the previous annual inspection. NPPD inspects the embankments weekly, and signs of burrowing animals are documented. Animal burrows on the embankment slopes should continue to be addressed and repaired, as necessary. Animal burrowing did not pose a threat to the structural stability of the facility at the time of the annual inspection.

3.4.2 Erosion

Erosion was observed on the outer embankment slopes on the north, 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 the areas on the south and west exterior slopes of Ash Landfill No. 3 that are frequently eroded so that appropriate surface water controls can be developed.

The terrace channels and downchute channel on the final cover appear to be functioning as designed.

3.5 Vegetation

Vegetative growth on the exterior slopes and final cover placed in 2015 appears to have struggled with the warm and dry weather in 2020. NPPD may consider irrigation of the exterior slopes if the vegetation does not rebound in 2021 to maintain vegetation capable of protecting the slopes from erosion.

The cottonwood seedlings observed inside of Ash Landfill No. 3 during previous inspections were not seen during the 2020 inspection. NPPD has taken steps to limit vegetative growth within Ash Landfill No. 3, and the east cell has now been covered with fly ash, which will help prevent vegetation from growing in that area.

4.0 CLOSING

An annual inspection was performed for the ash disposal facility at Gerald Gentleman Station on November 18, 2020. The inspection met the requirements for CCR landfills under 40 CFR Part 257.84. The inspection found no indication of major structural deficiencies. Minor maintenance items that should be addressed include burrowing animals, erosion, and continued promotion of vegetative growth 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.

Signature Page

Golder Associates Inc.



Jacob Sauer, PE
Associate and Senior Engineer



Jason Obermeyer
Associate and Senior Consultant

JS/JO/mp



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5.0 REFERENCES

Nebraska Public Power District and Golder Associates Inc. 2019. Renewal Application, Permit No. NE0203254, Gerald Gentleman Station, Ash Disposal Facility, May 25, 2019.

Nebraska Public Power District and Golder Associates Inc. 2019. 2019 Annual Inspection Report – Gerald Gentleman Station Ash Disposal Facility, December 19, 2019.

Figure

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PROJECT
NEBRASKA PUBLIC POWER DISTRICT
GERALD GENTLEMAN STATION

TITLE
ANNUAL PE INSPECTION REPORT

FIGURE

1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI/A

11x

APPENDIX A

Inspection Photographs

Ash Disposal Facility Annual Inspection, Gerald Gentleman Station**PHOTO 1**

Security gate & entrance to Ash Disposal Area

**PHOTO 2**

Minor erosion on crest of slope near southeast corner of closed Bottom Ash Landfill



Ash Disposal Facility Annual Inspection, Gerald Gentleman Station**PHOTO 3**

Vegetation on west exterior slope of Ash Landfill No. 3.

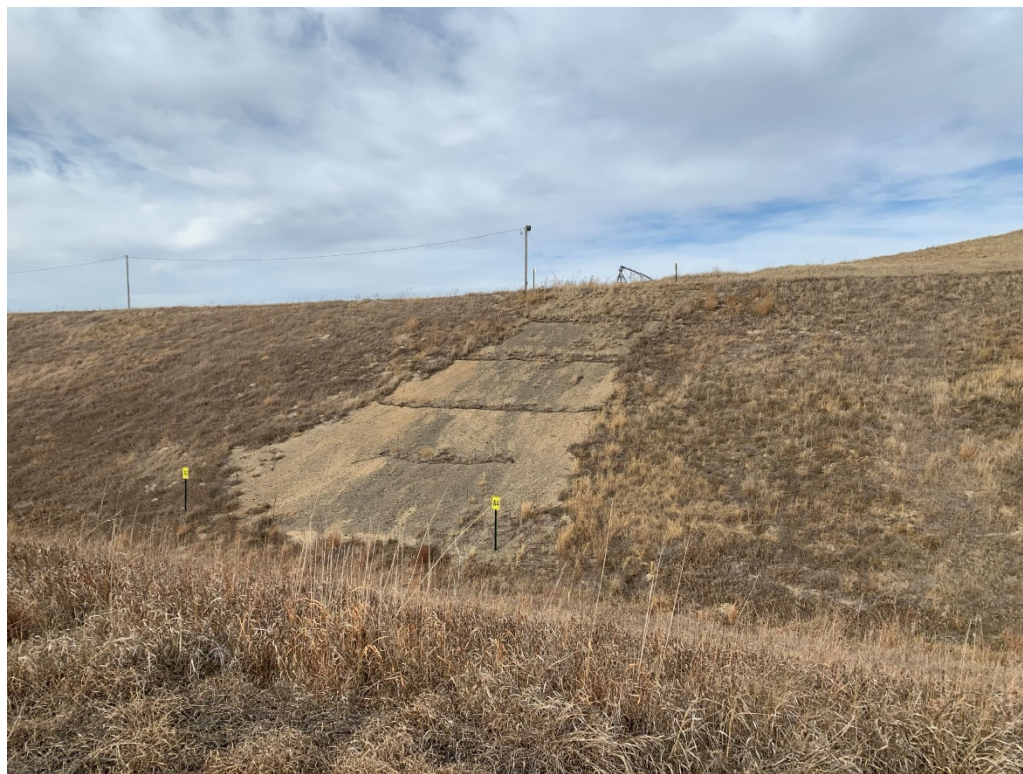
**PHOTO 4**

Perimeter road on west side of Ash Pit No. 3.



Ash Disposal Facility Annual Inspection, Gerald Gentleman Station**PHOTO 5**

Area of historical erosion needing revegetation

**PHOTO 6**

Downchute channel on south side of Ash Landfill No. 4



Ash Disposal Facility Annual Inspection, Gerald Gentleman Station**PHOTO 7**

Southern exterior
slopes of Ash
Landfill No. 3

**PHOTO 8**

Bottom ash
handling area on
east side of Ash
Landfill No. 4.



Ash Disposal Facility Annual Inspection, Gerald Gentleman Station**PHOTO 9**

Contact water channel on north side of Ash Landfill No. 4.

**PHOTO 10**

Edge of liner on north side of Ash Landfill No. 4.



Ash Disposal Facility Annual Inspection, Gerald Gentleman Station**PHOTO 11**

Active ash
deposition area in
Ash Landfill No. 3.

**PHOTO 12**

Contact water pond
on east end of Ash
Landfill No. 4.



Ash Disposal Facility Annual Inspection, Gerald Gentleman Station**PHOTO 13**

Access ramp to active deposition area on Ash Landfill No. 4.

**PHOTO 14**

Edge of liner signage on south side of Ash Landfill No. 4.



APPENDIX B

2020 Annual Inspection Form



Nebraska Public Power District

"Always there when you need us"

NEBRASKA PUBLIC POWER DISTRICT GERALD GENTLEMAN STATION

ASH DISPOSAL FACILITY ANNUAL INSPECTION

Date of Observations Wednesday, November 18, 2020

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	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	
Any changes to the utilities near or servicing the area?	Y	N	NI	NA	RA	

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 around perimeter, access is restricted by site security					
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

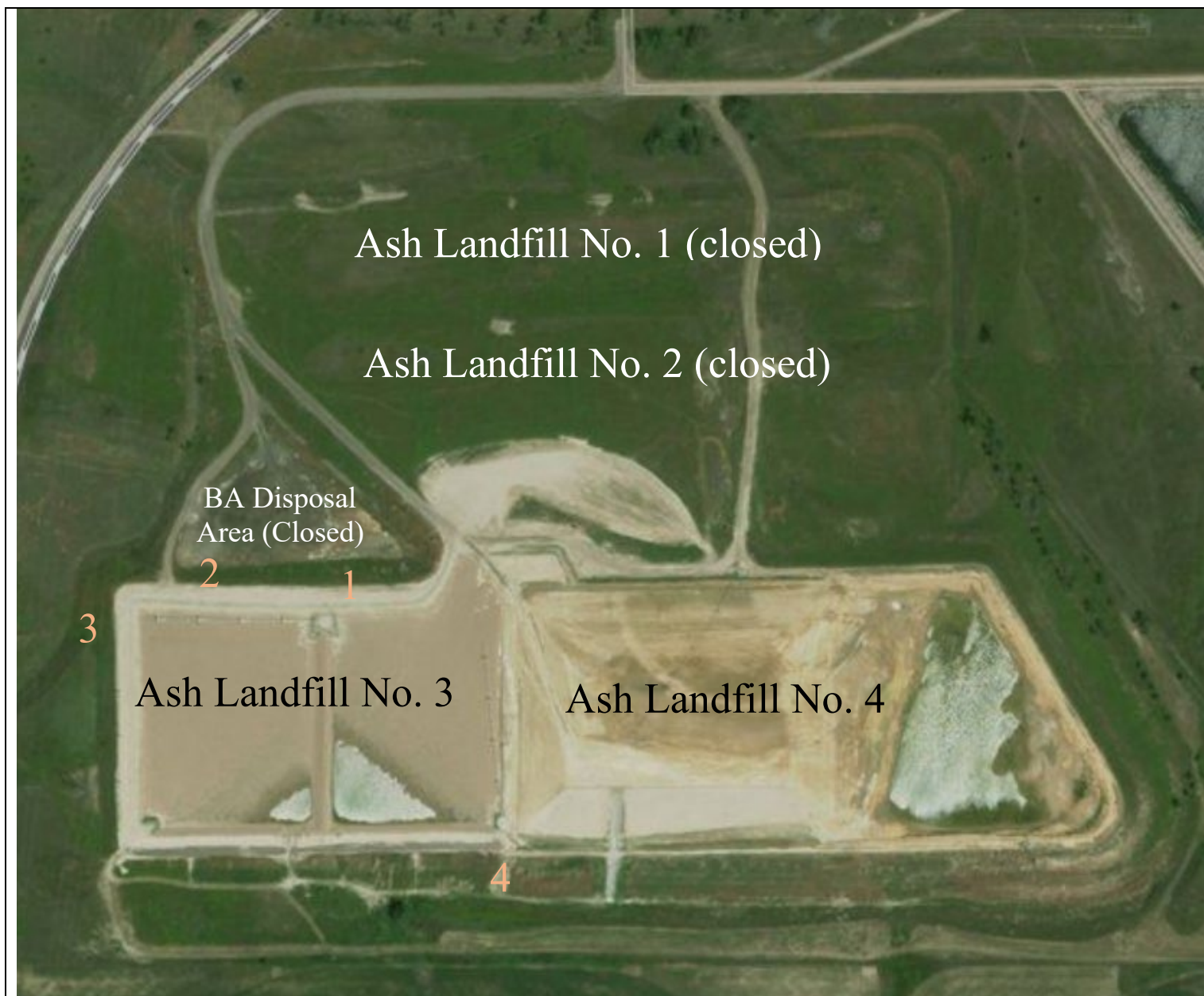
Are there signs of erosion in the disposal area such as gullies, dirt flows, etc.?	Y	N	NI	NA	RA	Erosion was observed on north, west and south sides of Ash Landfill No. 3 and south side of Ash Landfill No. 4.
Are there signs of differential settlement in the disposal area such as cracks, sinkholes, etc.?	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	Vegetation on most of the exterior slopes (and the region in general) was showing signs of stress due to lack of recent precipitation. No pockets of unusual vegetation were observed.

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	Minor animal burrows were observed.
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 ponding within the facility as designed.
Is there at least two feet of freeboard within the ash disposal facility?	Y	N	NI	NA	RA	
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	Straw wattles and silt fence are in place in a few areas.
Are all surface water control structures and monitoring devices in good condition?	Y	N	NI	NA	RA	
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.						
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	
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 aboveground 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?	There appears to be some abandoned mechanical equipment on the north side of the access road between Ash Landfill No. 3 and the closed bottom ash facility.					

Is partial closure of the facility occurring?	Y	N	NI	NA	RA	
Has seed and mulch been applied on the closed areas of the site?	Y	N	NI	NA	RA	
Any visible or exposed soil or geomembrane liner?	Y	N	NI	NA	RA	
Were the concerns from the last annual observation addressed and corrected?	Y	N	NI	NA	RA	

H. Comments

Describe any 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.



Notes:

- 1 – Erosion
- 2 – Housekeeping
- 3 – Erosion
- 4 – Erosion



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