



REPORT

2019 Annual Inspection Report

Gerald Gentleman Station Ash Disposal Facility

Submitted to:

Nebraska Public Power District

Gerald Gentleman Station

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Submitted by:

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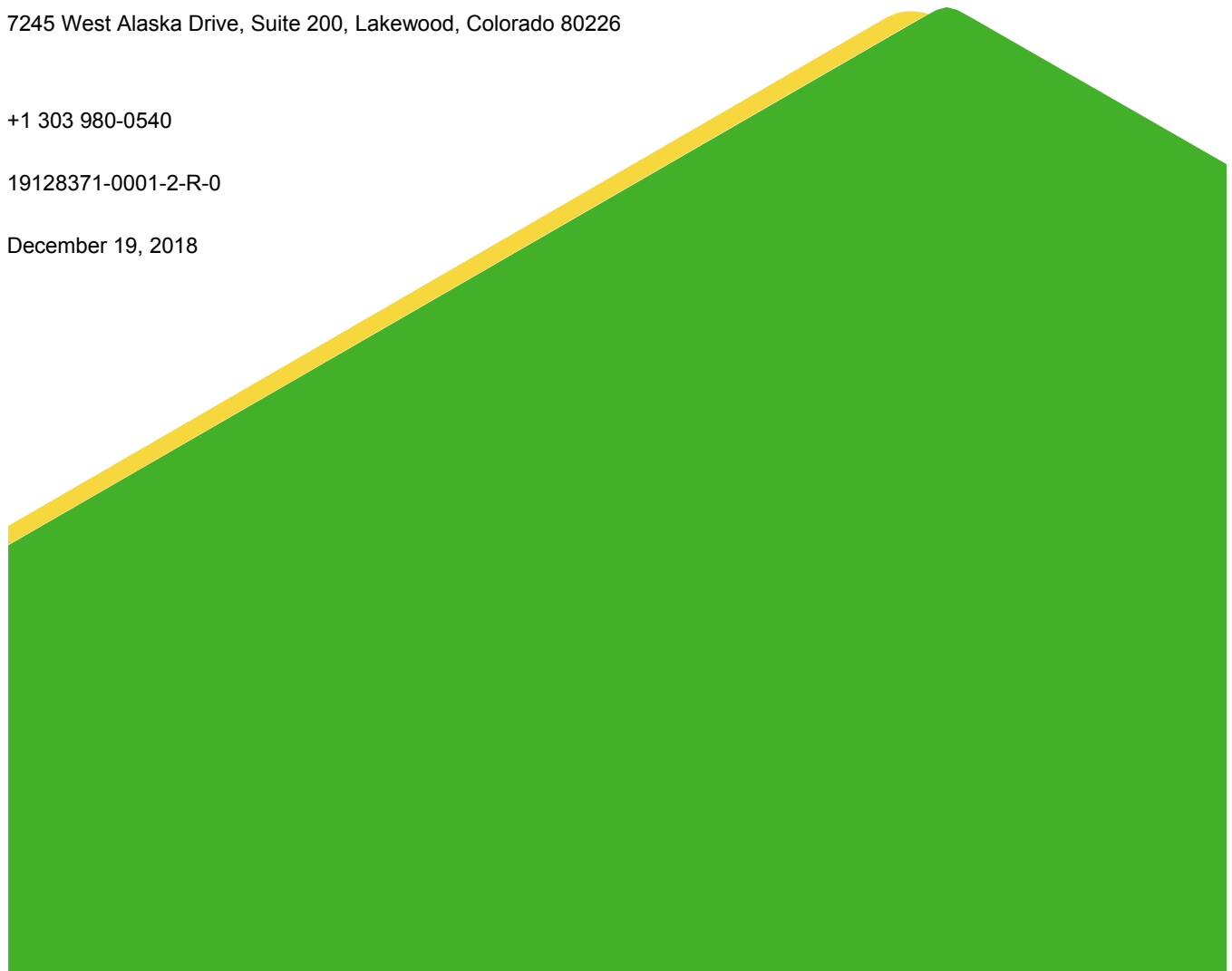


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Figure 1: Site Layout

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2019 Annual Inspection Form

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 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. Similar to recent years, significantly more fly ash was marketed in 2019, resulting in just approximately 17,900 tons being placed in the disposal facility through the end of September. 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 cubic yards. Ash will be placed in seven phases over a period of approximately 57 years.

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 from the annual inspection of the ash disposal facility performed on October 22, 2019.

2.0 REVIEW OF EXISTING INFORMATION

2.1 Previous Inspection Reports

This is the fifth 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 2018 inspection report (NPPD and Golder 2018) noted only minor areas for improvement, including:

- Erosion on exterior slopes
- Cottonwood saplings within Ash Landfill No. 3
- 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 2019 weekly inspection forms reported the following notable observations and activities:

- Erosion on west slope of Ash Landfill No. 3.
- Saplings in west cell of Ash Landfill No. 3.
- Locations of ash deposition and ponded water.
- Identification of animal burrows, trapping activities 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 (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-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, 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 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 the landfill, to the designated

contact water control pond. The contact water control 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 control 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 lined evaporation ponds or pumped to trucks for disposal or treatment.

3.0 2019 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 on October 22, 2019. 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 sections provide a summary of the observations made during the 2019 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 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 marketing. Based on data from 2014-2018, 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. Similar to recent years, significantly more fly ash was marketed in 2019, resulting in just approximately 17,950 tons being placed in the disposal facility through the end of September. NPPD will continue to maximize the marketing of fly ash versus on-site placement.

A nominal amount of bottom ash (<500 tons/year) is disposed of at GGS. Through September 2019, approximately 200 tons of bottom ash were disposed of in the bottom ash handling area on the east side of Ash Landfill No. 4. The majority of the bottom ash generated at GGS is sold; thus, fly ash is the primary product placed at the site's ash disposal facility.

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 October 22, 2019 site inspection.

3.4 Other Observations That Could Affect Stability

3.4.1 Burrowing Animals

Some evidence of burrowing animals was observed along the west outer slopes of Ash Landfill No. 3 (likely badger holes). The number of animal burrows observed was slightly higher compared with the previous 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 does not currently pose a threat to the structural stability of the facility at this time.

3.4.2 Erosion

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 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.

Vegetative growth on the final cover placed in 2015 has continued to improve, 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

The cottonwood seedlings observed inside of Ash Landfill No. 3 during previous inspections were not seen during the 2019 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.

One small pine tree was observed on the exterior slope on the northeast side of Ash Landfill No. 4. This tree should be removed.

4.0 CLOSING

An annual inspection was performed for the ash disposal facility at Gerald Gentleman Station on October 22, 2019. 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, removal of the small pine tree on the exterior slope of Ash Landfill No. 4, 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.

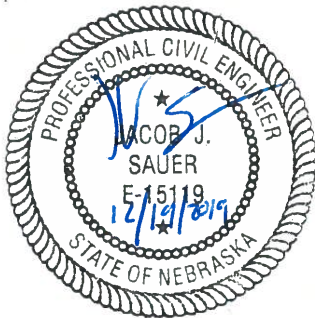


Jacob Sauer, PE
Senior Engineer



Jason Obermeyer
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JS/JO/rjg



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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. 2018. 2018 Annual Inspection Report – Gerald Gentleman Station Ash Disposal Facility, December 20, 2018.

Figure

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PROJECT
NEBRASKA PUBLIC POWER DISTRICT
GERALD GENTLEMAN STATION

TITLE
ANNUAL PE INSPECTION REPORT

FIGURE

1

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

APPENDIX A

Inspection Photographs

Gerald Gentleman Station



Photograph 1
Vegetation on exterior slope of ash landfill No. 3. (IMG_2082.JPG)



Photograph 2
Exterior slope vegetation. (IMG_2085.JPG)

Gerald Gentleman Station



Photograph 3
Security gate & entrance to closed Bottom Ash Disposal Area. (IMG_2087.JPG)



Photograph 4
Signage at entry to ash disposal facility. (IMG_2095.JPG)

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Photograph 5
Active ash deposition in Ash Landfill No. 3. (IMG_2100.JPG)



Photograph 6
Dust control center pivot at Ash Landfill No. 3. (IMG_2103.JPG)

Gerald Gentleman Station



Photograph 7
Animal Activity and erosion west exterior slope. (IMG_2110.JPG)



Photograph 8
Vegetation in south side of Ash Landfill No. 4. (IMG_2115.JPG)

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Photograph 9
Active fly ash deposition area with dust control equipment in Ash Landfill No. 3. (IMG_2119.JPG)



Photograph 10
Area without vegetation on south side of Ash Landfill No. 4. (IMG_2122.JPG)

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Photograph 11
Fly ash deposition in Ash Landfill No. 4. (IMG_2125.JPG)



Photograph 12
Downchute channel on south side of Ash Landfill No. 4. (IMG_2128.JPG)

Gerald Gentleman Station



Photograph 13
Contact water contained in east end of Ash Landfill No. 4. (IMG_2138.JPG)



Photograph 14
Bottom ash stockpile and handling area in Ash Landfill No. 4. (IMG_2139.JPG)

APPENDIX B

2019 Annual Inspection Form



Nebraska Public Power District

"Always there when you need us"

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

Date of Observations Tuesday, October 22, 2019

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?	Y	<u>N</u>	NI	NA	RA		

B. Facility Access

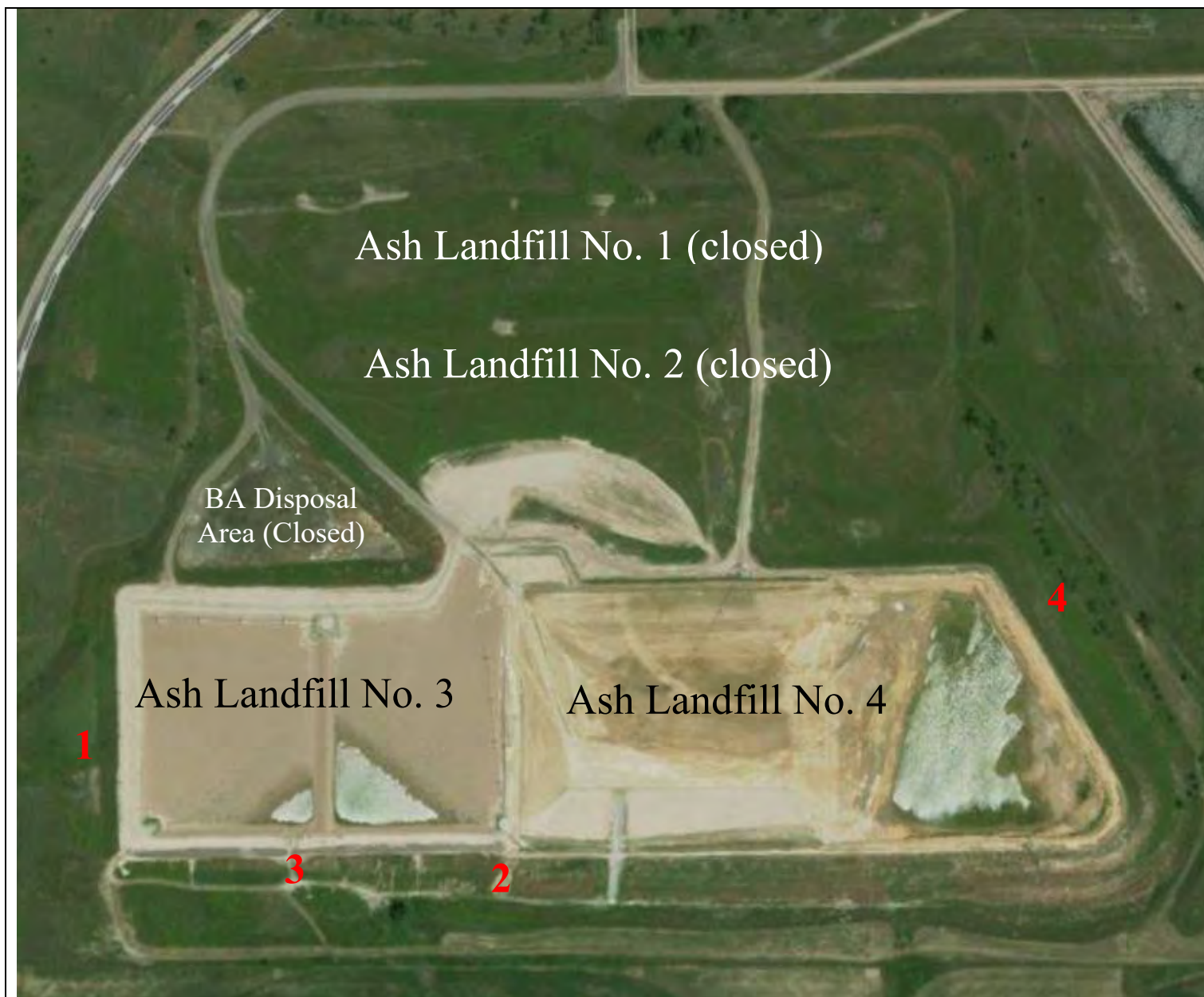
Do all entrances have signs detailing entrance authorization and allowed disposal material?	<u>Y</u>	N	NI	NA	RA	Recommend removal of sign in front of closed bottom ash facility
Are the roads to the site in good repair?	<u>Y</u>	N	NI	NA	RA	
How is access controlled to the site (fencing, locked gate, etc.)?	Fence around perimeter, access is restricted by site security					
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	Erosion rills/gullies were observed on the exterior slope on the west side of AP3 and on the south side of the west cell of AP3 just west of the riprap-lined overflow drainage
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 (may require new topsoil).

Any noticeable environmental concerns such as: odor, excessive dust or litter, discolored earth or water, infestation by animals, signs of open burning?	<u>Y</u>	N	NI	NA	RA	The disposal area does not have signs of animal infestation, but there are signs of animal activity in several areas that should be addressed.
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.	Y	N	NI	NA	RA	
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 riprap 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 now 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 aboveground 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	
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?	Y	<u>N</u>	NI	NA	RA	Although no major concerns were identified during the previous observation, minor erosion and vegetation issues have not yet been addressed. Recommend NPPD develops plan for re-vegetating area south of AP3/AP4 boundary and corrects erosion on west side of AP3.
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:

1 – Erosion rills on exterior slope

2 – Erosion west of riprap

3- Area of insufficient vegetation

4 – Small pine tree growing on exterior slope



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