



GOLDER

REPORT

2020 Annual Inspection Report

Sheldon Station Ash Landfill No. 4

Submitted to:

Nebraska Public Power District

Sheldon Station, 4500 West Pella Road
Hallam, Nebraska 68368

Submitted by:

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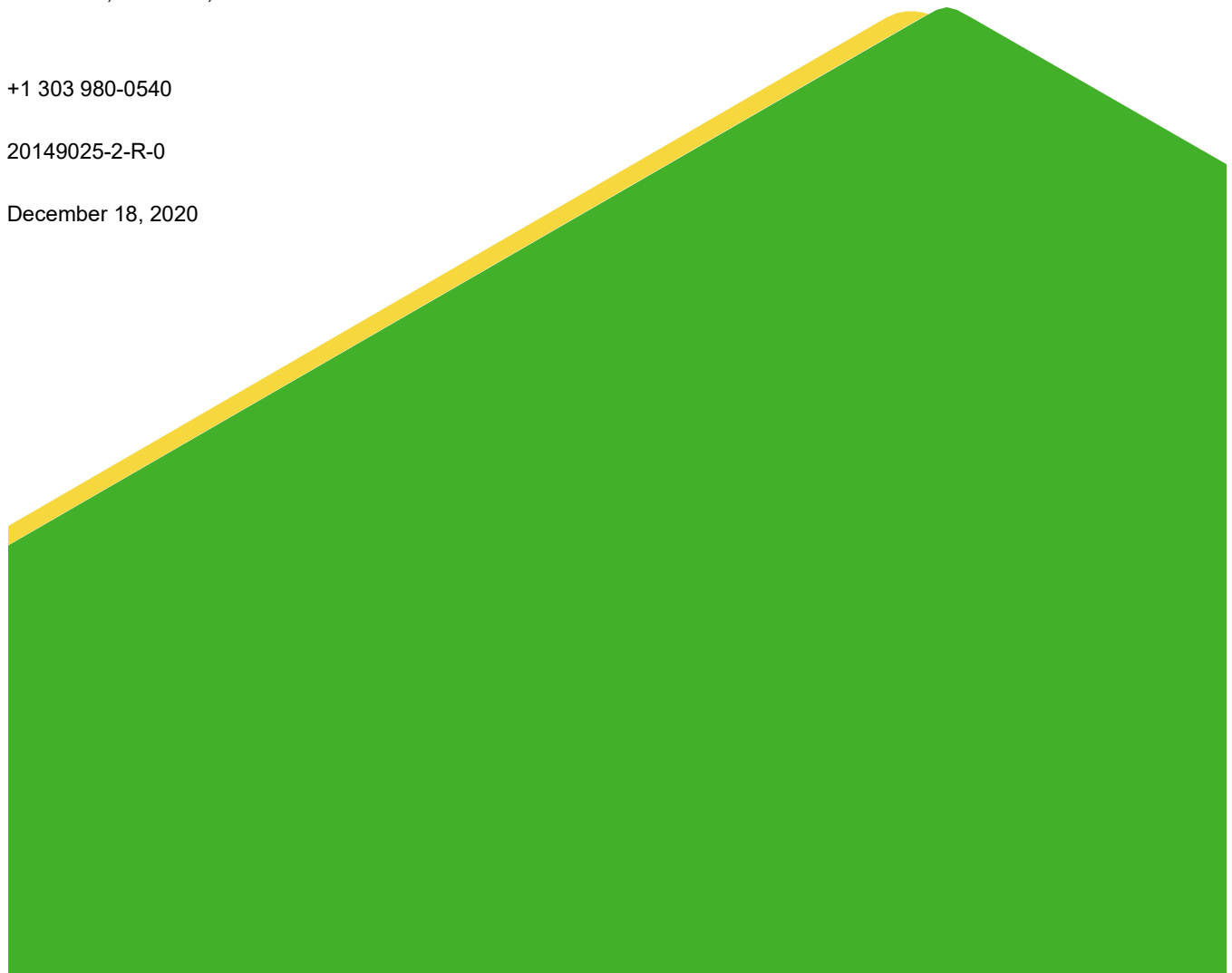


Table of Contents

1.0 INTRODUCTION AND BACKGROUND.....	1
2.0 REVIEW OF EXISTING INFORMATION	1
2.1 Previous Inspection Reports	1
2.2 Liner and Contact Water Collection System	2
2.3 Final Cover	2
2.4 Water Management.....	2
2.4.1 Stormwater.....	2
2.4.2 Contact Water	3
2.5 Evaporation Pond.....	3
2.6 CWCS Maintenance.....	3
2.7 Contact Water Uses	3
2.8 Underdrain System	4
3.0 2020 ANNUAL INSPECTION	4
3.1 Changes in Geometry	4
3.2 Volume of CCR	4
3.3 Signs of Structural Weakness	4
3.4 Other Observations That Could Affect Stability	4
3.4.1 Burrowing Animals	4
3.4.2 Erosion	5
3.4.3 Seepage.....	5
3.4.4 Embankment Crest Cracks	5
4.0 CLOSING	5
5.0 REFERENCES	7

FIGURES

Figure 1: Site Layout Map

APPENDICES

Appendix A

Inspection Photographs

Appendix B

Annual Inspection Form

1.0 INTRODUCTION AND BACKGROUND

Sheldon Station is a coal-fired electrical generation facility owned and operated by Nebraska Public Power District (NPPD) and is located in the southwest quarter of Section 19, Township 7N, Range 6E, near Hallam, Nebraska, in Lancaster County. The facility, which is capable of generating 225 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 Sheldon Station. Both products are marketed for beneficial re-use and the un-utilized amounts are placed into Ash Landfill No. 4 (see Figure 1). Ash Landfill No. 4 was constructed in 2002 and is operated in accordance with Nebraska Department of Environment and Energy (NDEE) Permit No. NE0204285.

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 satisfy the annual inspection requirements for CCR landfills under Part 257.84. The following sections present the findings from the annual inspection of Ash Landfill No. 4 performed on November 19, 2020.

2.0 REVIEW OF EXISTING INFORMATION

2.1 Previous Inspection Reports

This is the sixth annual inspection of Ash Landfill No. 4 performed by a professional engineer (PE) licensed in the State of Nebraska as required by the CCR Rule. The previous annual PE 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:

- Animal burrows
- Minor erosion 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 maintenance activities:

- Maintenance was performed on the sump pumps on multiple occasions throughout the year, including acid wash of sump and cleanout of pump.
- Removal of undesirable vegetation (including small cedar saplings) was ongoing throughout 2020.
- Minor animal burrows (likely badgers) were addressed at times throughout the year.
- During the spring thaw NPPD site inspection reports noted apparent seepage in the exterior perimeter road in the northeast corner of the facility. The water was suspected to be related to the spring frost melt following the high-permeability surface gravel and daylighting in this area, and not the result of seepage from the ash disposal facility.
- Cracking was observed in the perimeter road around the crest of the facility embankment throughout the fall. The cracking was attributed to the warm and dry conditions desiccating the surface soils.

2.2 Liner and Contact Water Collection System

The configuration of the liner and contact water collection system (CWCS) at Ash Landfill No. 4 is as follows, from top to bottom:

- At least three feet of select fill or fly ash, serving as a protective layer to prevent trafficking damage to the liner
- Geotextile (eight ounces per square yard) (Trevira 011/280)
- One foot of contact water collection material and four-inch perforated piping to reduce drainage lengths (ADS N-12 LF)
- Three feet of low-permeability soil (LPS) liner
- Subdrain system consisting of gravel and four-inch perforated pipe trenches (ADS N-12 LF)
- The configuration of the liner system on the side slopes is, from top to bottom:
 - Protective layer of 0.67 feet (8 inches) of revegetated soil, covered by fly ash
 - Three feet of LPS liner

The CWCS is designed to prevent the buildup of hydrostatic head of more than one foot on the liner system outside the sump area. In conjunction with the Evaporation Pond, the CWCS is designed to remove contact water from the landfill. This is accomplished by grading the ash to the south to promote drainage toward the sump.

A composite-lined evaporation pond is located immediately south of Ash Landfill No. 4. This pond stores contact water pumped from the CWCS and enhances evaporative loss. The Evaporation Pond liner consists of 2 feet of LPS, overlain by textured 60-mil high-density polyethylene (HDPE) geomembrane.

2.3 Final Cover

Final cover has not been placed because fill grades have not been reached yet. The current operational plan for Ash Landfill No. 4 is a phased closure plan; interim cover will not be used.

2.4 Water Management

Stormwater, contact water, and groundwater are managed at Ash Landfill No. 4. 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 provided in the following sections. Descriptions of CWCS maintenance, contact water uses, and the National Pollutant Discharge Elimination System (NPDES) permit are also included.

2.4.1 Stormwater

Stormwater that falls outside the landfill footprint (and therefore does not come into contact with ash) drains to natural surface water draws located east and west of the landfill. The landfill perimeter berm provides a surface water divide so that stormwater is diverted away from the landfill.

The perimeter berms will contain ash contact water within the landfill until final grades have been achieved and final cover has been installed. The final cover grades have been designed to shed water and prevent ponding over 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 with the CWCS and ash grading. The active ash deposition area is graded to maintain an approximately 3% slope to direct contact water towards the collection sump. Contact water is pumped from the collection sump into the Evaporation Pond. The collection sump pump has sufficient capacity and head capabilities to pump the contact water into the Evaporation Pond.

Ash is placed to promote contact water flow on the surface of the ash from the landfill perimeter toward the middle and southern areas of the landfill. Contact water that does not infiltrate into the CWCS is impounded on the ash surface. A portable pump capable of pumping impounded contact water to the Evaporation Pond is used as needed.

Once ash levels become higher than the perimeter berm, ash will be placed so that contact water sheds towards the cell runoff drainage control channel around the perimeter of the landfill and to the collection sump. Ash adjacent to the perimeter berm will not be placed higher than the perimeter berm to maintain the cell runoff drainage control channel. The cell runoff drainage control channel is designed to divert water to the southern portion of the landfill for impoundment and to accommodate the current operational plan. A portable pump capable of pumping impounded contact water to the Evaporation Pond will be used as needed.

2.5 Evaporation Pond

The Evaporation Pond has the capacity to store water from more than the 25-year, 24-hour storm from the landfill, and handle the runoff from the landfill for the period in which ash levels are below the height of the perimeter berm. In the unlikely event that successive storms cause water levels to rise to near the top of the Evaporation Pond's berms, the water will drain back into the landfill through an overflow pipe, until the point at which ash placement rises above the top of the landfill perimeter berm. Once ash placement is above the perimeter berm, the overflow pipe will be abandoned. The current phased operational plan will minimize the volume of contact water so that water from a 25-year, 24-hour storm can either be contained in the Evaporation Pond or impounded within the landfill, or both.

In March 2012, an aerator was installed in the Evaporation Pond to increase evaporation of contact water. A bubbler was installed during the fall of 2012. The bubbler helps prevent water in the Evaporation Pond from freezing so that the contact water can be used year-round for dust suppression within the lined landfill footprint.

2.6 CWCS Maintenance

Performance of the CWCS is evaluated periodically. The evaluation includes the sump, pumps, other related appurtenances, and overall system performance. Repairs determined necessary based on these evaluations are completed by NPPD, and records of the repairs are maintained as part of the weekly inspection reports.

2.7 Contact Water Uses

Contact water is periodically pumped from the Evaporation Pond into the site's water truck for operational functions such as fugitive dust suppression over the lined landfill footprint. Contact water is not sprayed outside of the lined landfill footprint and will not be sprayed over final cover.

2.8 Underdrain System

Beneath the LPS liner of the landfill is an underdrain system, which consists of a series of trenches and drains that surround the base of the landfill to collect groundwater. Groundwater within the underdrain system flows to the southern end of the Evaporation Pond into a sump within an interceptor trench. The underdrain consists of perforated pipe within a gravel trench. The intent of this underdrain system is to keep groundwater at least 5 feet below the base of the landfill liner. Water from the sump is pumped to the Evaporation Pond or, under the facility's NPDES permit (NE0111490), can be discharged to a tributary of Olive Branch (Outfall 003).

3.0 2020 ANNUAL INSPECTION

On the morning of November 19, 2020, Jacob Sauer, Nebraska P.E. (E-15119), of Golder performed an inspection of Ash Landfill No. 4 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 traversing up and down the 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 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 site inspection.

3.2 Volume of CCR

The sources and materials deposited in Ash Landfill No. 4 consist of fossil fuel combustion ash, defined pursuant to Title 132 of the Nebraska Administrative Code. Ash quantities vary from year to year due to plant generation levels, market conditions, weather, and other factors. NPPD produced approximately 4,030 tons of fly ash and 4,950 tons of bottom ash at Sheldon Station in 2020 (through October 2020). Of the ash produced, approximately 1,000 tons of fly ash and 130 tons of bottom ash were placed in Ash Landfill No. 4. Approximately 266,000 cubic yards of fly ash and bottom ash had been placed in Ash Landfill No. 4 since operations began at the facility in 2002 through October 2020. The remaining lifespan of the facility is estimated to be 20 years.

3.3 Signs of Structural Weakness

No sign of structural weakness of Ash Landfill No. 4 was observed during the site inspection on November 19, 2020.

3.4 Other Observations That Could Affect Stability

3.4.1 Burrowing Animals

Isolated signs of historical (inactive) large animal burrowing have been previously observed around the ash disposal facility. Efforts by NPPD and USDA to trap and relocate large burrowing animals appear to have been successful, as no significant animal burrows were observed during the inspection. Regardless, the embankments will continue to be inspected weekly, and signs of burrowing animals will be closely watched by plant personnel. Any increase in the level of small animal activity, or any sign of large animal burrowing, will be remedied by trapping and removal to an off-site location.

3.4.2 Erosion

Minor erosional rills have been observed near the toe of the exterior slopes in the northeast corner and north side of the facility during previous inspections. NPPD has repaired these areas and backfilled the erosion rills with crushed rock. Vegetation has generally been established in the repaired areas, and significant erosion was not observed on the exterior slopes. NPPD should continue to monitor the exterior slopes and perimeter roads of the disposal facility for erosion, both during weekly inspections and after large rain events, making repairs, as necessary.

3.4.3 Seepage

In reviewing the weekly inspection reports, NPPD noted that during the spring thaw apparent seepage was observed from the exterior perimeter road in the northeast corner of the facility. The water was suspected to be surface water infiltration and frost melt following the high-permeability surface gravel and daylighting in this area (and not indicative of seepage from ash disposal facility). No signs of seepage were observed during the annual inspection on November 19, 2020. Vegetation in this area was indistinguishable from the surrounding areas and no signs of instability were observed. NPPD should continue to monitor this area during weekly inspections and notify Golder if any changes are observed.

3.4.4 Embankment Crest Cracks

Surficial cracks were observed in the perimeter road around the crest of the facility embankment during the annual inspection. Cracks were observed in multiple locations around the perimeter, as large as approximately one inch wide. The cracking was not observed to be more than a few inches deep with no accompanying displacement and is likely due to warm and dry conditions desiccating the surface soils. NPPD should continue to closely monitor the cracking and report to Golder immediately if the cracks change in size or additional cracks appear or displacement is observed.

4.0 CLOSING

The 2020 annual inspection for Ash Landfill No. 4 at Sheldon Station was performed on November 19, 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 will need to be continually addressed include tracking and removal of large burrowing animals and removal of woody vegetation growing on the interior and exterior slopes. Additionally, NPPD should continue to monitor the minor cracking in the perimeter road and the location of apparent seepage and notify Golder of any changes.

We appreciate the opportunity to provide NPPD with assistance related to Ash Landfill No. 4 at Sheldon 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/mb

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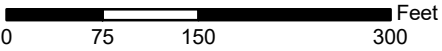


5.0 REFERENCES

- Nebraska Public Power District and Golder Associates Inc. 2001. Permit Application/Operational Plan to Operate the NPPD Sheldon Station Fly/Bottom Ash Landfill No. 4, Volume I, July 31 (Revision 3).
- Nebraska Public Power District and Golder Associates Inc. 2007. Renewal Application, Permit No. NE0204285, Sheldon Station, Ash Landfill No. 4, April 24.
- Nebraska Public Power District and Golder Associates Inc. 2012. Renewal Application, Permit No. NE0204285, Sheldon Station, Ash Landfill No. 4, April 10.
- Nebraska Public Power District and Golder Associates Inc. 2019. Annual Inspection Report – Sheldon Station Ash Disposal Facility, December 17, 2019.

FIGURE 1

Site Layout Map



REFERENCE

1. AERIAL IMAGERY: ESRI BASEMAP SERVICES, LANCASTER COUNTY NE ORTHOS. IMAGE CAPTURED MARCH 2018.

CLIENT
NEBRASKA PUBLIC POWER DISTRICT

PROJECT
ANNUAL INSPECTION REPORT
SHELDON STATION
ASH LANDFILL NO. 4

TITLE
SITE LAYOUT MAP

	CONSULTANT	YYYY-MM-DD	2018-12-14
		PREPARED	KJC
		DESIGN	KJC
		REVIEW	JJS
		APPROVED	JEO

PROJECT No.
18101264

FIGURE
1

APPENDIX A

Inspection Photographs

Ash Disposal Facility Annual Inspection, Sheldon Station**PHOTO 1**

Control building for
underdrain and
sump pumps

**PHOTO 2**

Bubble aerator in
contact water
evaporation pond



Ash Disposal Facility Annual Inspection, Sheldon Station**PHOTO 3**

Contact water pond
on south side of ash
disposal facility

**PHOTO 4**

Access road into
ash disposal facility



Ash Disposal Facility Annual Inspection, Sheldon Station**PHOTO 5**

Crack in perimeter
road along
embankment top

**PHOTO 6**

Perimeter access
road



Ash Disposal Facility Annual Inspection, Sheldon Station**PHOTO 7**

Northern exterior
slope of ash
disposal facility

**PHOTO 8**

Western exterior
slope of ash
disposal facility



Ash Disposal Facility Annual Inspection, Sheldon Station**PHOTO 9**

Active ash
placement area

**PHOTO 10**

Exterior slope on
north side of ash
disposal facility



Ash Disposal Facility Annual Inspection, Sheldon Station**PHOTO 11**

Area of seepage
observed by NPPD
in March 2020

**PHOTO 12**

Exterior slope in
northeast corner of
ash disposal facility



Ash Disposal Facility Annual Inspection, Sheldon Station**PHOTO 13**

Perimeter road on
east embankment
crest

**PHOTO 14**

Contact water
management pond



APPENDIX B

Annual Inspection Form



Nebraska Public Power District

"Always there when you need us"

NEBRASKA PUBLIC POWER DISTRICT SHELDON STATION

ASH DISPOSAL FACILITY ANNUAL INSPECTION

Date of Observations: November 19, 2020		Legend: Y Yes N No NI Not Inspected NA Not applicable RA Requires action
Inspector: Jacob Sauer	Title: Sr. Engineer	
Inspector:	Title:	
Facility: Ash Landfill No. 4		

A. Area Status

Status of Disposal Area	<u>Active</u>		Inactive				Closed
If inactive, how long inactive?							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 with locked gate					
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	
Are there signs of differential settlement in the disposal area such as cracks, sinkholes, etc.?	Y	N	NI	NA	RA	Cracking in road surface along perimeter embankment crest was observed. Cracking was attributed to dry conditions and NPPD will continue to monitor during weekly inspections.
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	

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 have been observed in the past. NPPD will continue to monitor for animal activity.
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 contained in the south end of the facility by design. Water levels were historically low during inspection.
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	Exterior slopes are well vegetated. No changes to site erosion controls are necessary at this time.
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 feature.						
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	NPPD observed seepage in the NE corner perimeter road near the toe of the embankment during the spring. The seepage stopped after the frost thawed. No signs of seepage were observed during the annual inspection.
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	

When was the last listed maintenance for the pump (if in operation only)?	Pump and sump system was serviced/cleaned out in the spring.					
G. Facility Overview						
What material is currently being placed at the facility?	Bottom ash & fly ash – both in very limited quantities.					
Any housekeeping concerns about the waste placement, coverage, and vegetation for visitors and neighbors?	No.					
Is partial closure of the facility occurring?	Y	N	NI	NA	RA	No partial closure has occurred as of the time of the inspection.
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	The leachate evaporation pond liner is exposed by design. No liner was observed to be exposed within the ash disposal facility.
Were the concerns from the last annual observation addressed and corrected?	Y	N	NI	NA	RA	



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