



2017 ANNUAL INSPECTION REPORT

ASH LANDFILL NO. 4

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# 2017 ANNUAL INSPECTION REPORT SHELDON STATION ASH LANDFILL NO. 4

**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**

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**Submitted By:** Nebraska Public Power District  
Sheldon Station  
4500 West Pella Road  
Hallam, Nebraska 68368

**Prepared By:** Golder Associates Inc.  
44 Union Boulevard, Suite 300  
Lakewood, Colorado 80228

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1785149





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## 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 (see Figure 1). 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 2). Ash Landfill No. 4 was constructed in 2002, and is operated in accordance with Nebraska Department of Environmental Quality (NDEQ) 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 of the annual inspection of Ash Landfill No. 4 performed on October 25, 2017.



## 2.0 REVIEW OF EXISTING INFORMATION

### 2.1 Previous Inspection Reports

This is the third annual inspection performed by a professional engineer (PE) licensed in the State of Nebraska of Ash Landfill No. 4 as required by the CCR Rule. The previous annual PE inspections did not find signs of structural weakness or changes in geometry. The 2016 inspection report noted only minor areas for improvement, including:

- Animal burrows (with some burrows likely from larger animals).
- 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 2017 weekly inspection forms reported the following notable maintenance activities:

- Simbeck and Associates performed repairs on the geomembrane liner at the leachate evaporation pond on March 30, 2017. The repairs included fixing a tear in the geomembrane near the overflow pipe, and two spot defects.
- The United States Department of Agriculture (USDA) was on site several times in 2017 to assist NPPD by trapping and relocating burrowing animals in the area of the ash disposal facility.
- Then NDEQ performed an annual inspection of the site on May 31, 2017 and reported no issues.
- Maintenance on the sump pumps on multiple occasions.
- Removal of undesirable vegetation (including small trees) was ongoing throughout 2017.

### 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
- Eight-oz. geotextile (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 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 two 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 on the surface of the ash to flow 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 of 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 to 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 five 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 2017 ANNUAL INSPECTION

On the afternoon of October 25, 2017, Jacob Sauer 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 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 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 in Ash Landfill No. 4 consist of fossil fuel combustion ash, defined pursuant to Title 132. Ash quantities vary from year to year due to plant generation levels, market conditions, weather, and other factors. NPPD placed approximately 4,400 tons of fly ash and 3,140 tons of bottom ash at Ash Landfill No. 4 in 2017 (through November 2017). Approximately 250,000 cubic yards of fly ash and bottom ash have been placed in Ash Landfill No. 4 since operations began at the facility in 2002 through November 2017. The remaining lifespan of the facility is estimated to be 20 years.

#### 3.3 Signs of Structural Weakness

No sign of any structural weakness of Ash Landfill No. 4 was observed during the site inspection on October 25, 2017.

#### 3.4 Other Observations That Could Affect Stability

##### 3.4.1 Burrowing Animals

Isolated signs of historic (inactive) large animal burrowing were observed around the ash disposal facility. Efforts by NPPD and USDA to trap and relocate large burrowing animals appear to have been successful. 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 Embankment Cracking

The desiccation cracking observed during the 2015 annual inspection was not apparent during the 2016 or 2017 annual inspections. NPPD will continue to monitor the embankment crests for cracking during weekly





site inspections by plant personnel. Any increase in the width and/or frequency of the cracks will be evaluated.

### **3.4.3 Erosion**

Minor erosional rills were observed near the toe of the north berm in during the 2015 annual inspection. 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 of the disposal facility for erosion, both during weekly inspections and after large rain events.



#### 4.0 CLOSING

The 2017 annual inspection for Ash Landfill No. 4 at Sheldon Station was performed on October 25, 2017. The inspection met the requirements for CCR landfills under 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.

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.

Sincerely,

**GOLDER ASSOCIATES INC.**

Jacobb Sauer, PE  
Senior Projection Engineer

Ron Jorgenson  
Principal and Senior Practice Leader





## 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, 2001 (Revision 3).

Nebraska Public Power District and Golder Associates Inc., 2007. Renewal Application, Permit No. NE0204285, Sheldon Station, Ash Landfill No. 4, April 24, 2007.

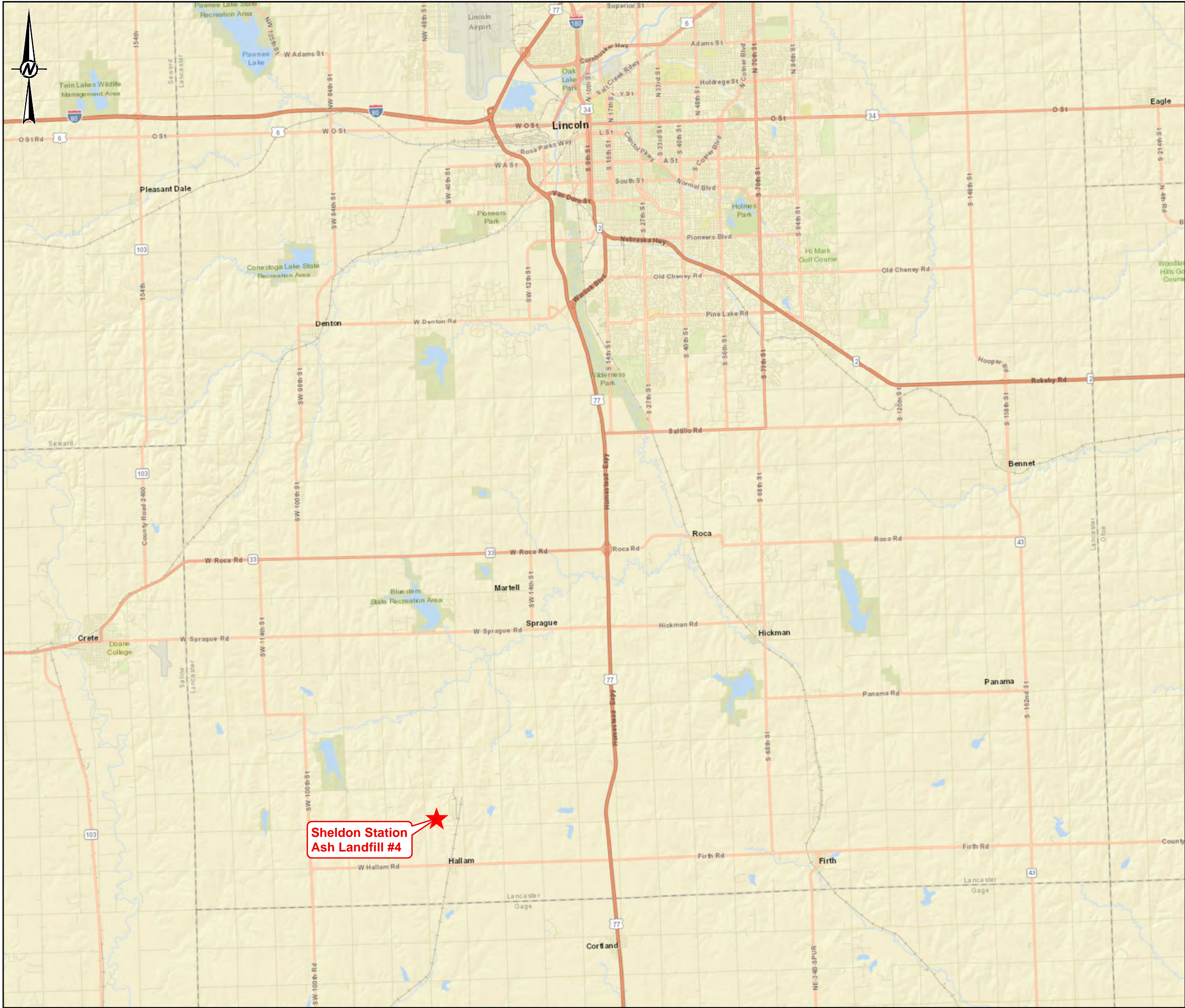
Nebraska Public Power District and Golder Associates Inc., 2012. Renewal Application, Permit No. NE0204285, Sheldon Station, Ash Landfill No. 4, April 10, 2012.

Nebraska Public Power District and Golder Associates Inc., 2015. Annual Inspection Report – Sheldon Station Ash Disposal Facility, October 2, 2015.

Nebraska Public Power District and Golder Associates Inc., 2017. Annual Inspection Report – Sheldon Station Ash Disposal Facility, January 6, 2016.

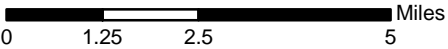
## FIGURES





LEGEND

★ ASH LANDFILL #4




REFERENCE

1. COORDINATE SYSTEM: NAD27 STATE PLANE NEBRASKA SOUTH, US FEET.
2. BACKGROUND IMAGES COURTESY OF ESRI BASEMAP SERVICES, 2015.

CLIENT  
NEBRASKA PUBLIC POWER DISTRICT

PROJECT  
2017 ANNUAL INSPECTION REPORT  
SHELDON STATION  
ASH LANDFILL NO. 4

TITLE  
SITE VICINITY MAP

	CONSULTANT	YYYY-MM-DD	2017-11-27
		PREPARED	KJC
		DESIGN	KJC
		REVIEW	TLR
		APPROVED	RRJ

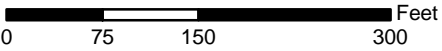
PROJECT No.  
1785149

FIGURE  
1





LEGEND




REFERENCE

- 1. COORDINATE SYSTEM: NAD27 STATE PLANE NEBRASKA SOUTH, US FEET.
- 2. AERIAL IMAGERY: ESRI BASEMAP SERVICES, NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP), USDA. IMAGE CAPTURED MARCH 2016.

CLIENT  
NEBRASKA PUBLIC POWER DISTRICT

PROJECT  
2017 ANNUAL INSPECTION REPORT  
SHELDON STATION  
ASH LANDFILL NO. 4

TITLE  
SITE LAYOUT MAP

	CONSULTANT	YYYY-MM-DD	2017-11-27
		PREPARED	KJC
		DESIGN	KJC
		REVIEW	TLR
		APPROVED	RRJ

PROJECT No.  
1785149

FIGURE  
2



**APPENDIX A**  
**INSPECTION PHOTOS**



## Ash Landfill No. 4 Annual Inspection, Sheldon Station

### PHOTO 1

Contact water contained within the lined facility.



### PHOTO 2

Site access road.







**PHOTO 3**  
LCS riser pipe.







**PHOTO 4**

Vegetation on  
west slope of  
Ash Landfill  
No. 4.







**PHOTO 5**

Active disposal  
area looking  
east.







**PHOTO 6**

Exterior slope  
on east side of  
Ash Landfill  
No. 4.







**PHOTO 7**

Rock placed on north side of facility to prevent erosion and allow vehicle traffic.







### PHOTO 8

Signage near  
facility  
entrance.







**PHOTO 9**

Contact water evaporation pond.



**PHOTO 10**

Small animal burrow just outside of evaporation pond fence.



**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   October 25, 2017		Legend:   Y   Yes N   No NI   Not Inspected NA   Not applicable RA   Requires action
Inspector:   Jacob Sauer, P.E.	Title:   Senior Engineer	
Inspector:	Title:	
Facility:   Ash Landfill No. 4		

*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	<u>Active</u>		Inactive				Closed
If inactive, how long inactive?			N/A				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?	<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.)?	Fence with locked gate					
Are the facility boundaries clearly marked?	<u>Y</u>	NB	NI	NA	RA	
Are there signs of unauthorized access to the site such as trails or gaps in the fencing?	<u>Y</u>	N	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.?	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		
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	<u>N</u>	NI	NA	RA	Minor animal burrows 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	Water is ponding as designed in the southern end of the lined facility.
Is there at least two feet of freeboard within the ash disposal facility?	<u>Y</u>	N	NI	NA	RA	
<b>D. Water Control Structures</b>						
Is there any erosion or blockage of the diversion channels? Are the channels clearly defined?	Y	N	NI	<u>NA</u>	RA	
Are temporary erosion controls in place? Describe.	Y	N	NI	<u>NA</u>	RA	
Are all surface water control structures and monitoring devices in good condition?	<u>Y</u>	N	NI	NA	RA	
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 feature.	Contact water evaporation pond is in good condition					
<b>E. Structural Stability</b>						
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	
<b>F. Pumps, Pipelines, and Distribution Systems</b>						
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	
<b>G. Facility Overview</b>						
What material is currently being placed at the facility?	Primary material placed is fly ash.					

Any housekeeping concerns about the waste placement, coverage, and vegetation for visitors and neighbors?	<b>Minor animal burrows should be monitored. If additional animal activity is observed, NPPD should plan to trap animals and fill holes.</b>					
Is partial closure of the facility occurring?	Y	<u>N</u>	NI	NA	RA	
Has seed and mulch been applied on the closed areas of the site?	Y	N	NI	<u>NA</u>	RA	
Any visible or exposed soil or geomembrane liner?	Y	<u>N</u>	NI	NA	RA	<b>No exposed geomembrane within landfill. Evaporation pond liner is exposed by design.</b>
Were the concerns from the last annual observation addressed and corrected?	<u>Y</u>	N	NI	NA	RA	
<b>H. Comments</b>						
	<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>Vegetation on exterior slopes is well established. Significant erosion was not observed on exterior or interior slopes.</p>					