REPORT

2023 Annual Inspection Report

Gerald Gentleman Station Ash Disposal Facility

Submitted to:

Nebraska Public Power District

Gerald Gentleman Station
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Sutherland, Nebraska 69165

Submitted by:

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December 12, 2023

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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 megawatts (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 (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 (CFR). 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 November 28, 2023.

2.0 REVIEW OF EXISTING INFORMATION

2.1 Inspection Reports

This is the eighth Professional Engineer (PE) inspection of the ash disposal facility as per 40 CFR Part 257.84 (b) requirements. Previous inspections did not find signs of structural weakness or changes in geometry. The 2022 inspection report (Golder 2022) noted only minor maintenance items, including burrowing animals, erosion, and continued promotion of vegetative growth on exterior slopes.

NPPD also performs weekly inspections of the ash disposal facility. Observations from the weekly inspections are recorded on inspection forms, which are maintained in the site operating record. The 2023 weekly inspection forms reported the following notable observations and activities:

- erosion on the west slope of Ash Landfill No. 3 and south slopes of Ash Landfill No. 3 and Ash Landfill No. 4
- locations of ash deposition and ponded water

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 at least 6 inches and compacted to at least 95% 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} centimeters per second) 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 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 does come into contact with ash is classified as contact water. Water management methods are presented in the following sections.

2.4.1 Stormwater

Precipitation 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 at Ash Landfill No. 4 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 precipitation that falls 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 2023 ANNUAL INSPECTION

Jacob Sauer, Nebraska PE (E-15119), of WSP performed an inspection of the ash disposal facility per 40 CFR Part 257.84(b) requirements on November 28, 2023. 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 forms and observations. Photographs were taken and are presented in Appendix A. The following sections provide a summary of the observations made during the 2023 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 Coal Combustion Residuals

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 disposal facility. The daily quantity of fly ash placed varies due to generation levels and ash marketing.

Based on data from 2014 through 2018, GGS generates an average of approximately 198,400 tons of fly ash each year. Of that total, an average of approximately 154,700 tons have historically been sold annually, and approximately 43,700 dry tons were placed in the ash disposal facility each year, on average. GGS generated approximately 140,700 tons of fly ash and 23,100 tons of bottom ash from January 1, 2022, through October 31, 2022. Of this amount, 16,800 tons of fly ash were disposed in the ash disposal facility. No bottom ash was permanently disposed on site in 2023. The conservative 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 tons/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 cy.

3.3 Signs of Structural Weakness

No signs of structural weakness were observed during the November 28, 2023 inspection.

3.4 Other Observations That Could Affect Stability

3.4.1 Burrowing Animals

Evidence of burrowing animals was observed near the toe of the south exterior slopes of Ash Landfill No. 4 (likely badger holes). 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 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 and south side of Ash Landfill No. 4 that are frequently eroded so that vegetation can be established to minimize future erosion.

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

4.0 CLOSING

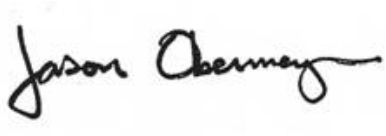
An annual inspection was performed for the ash disposal facility at Gerald Gentleman Station on November 28, 2023. The inspection met the requirements for CCR landfills under 40 CFR Part 257.84. The inspection found no indication of major structural deficiencies. Minor maintenance items that should be addressed include erosion and continued promotion of vegetative growth on exterior slopes.

WSP appreciates the opportunity to provide NPPD with assistance related to the ash disposal facility at GGS. Please let us know if you have any questions or need additional support.

5.0 REFERENCES

Golder (Golder Associates USA Inc.). 2022. 2022 Annual Inspection Report – Nebraska Public Power District, Gerald Gentleman Station Ash Disposal Facility, December 12, 2022.

WSP USA Inc.



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https://wsponlinenam.sharepoint.com/:w:/r/Sites/Global-202318252/Project%20Files/6%20Deliverable/003-RPT_2023_Annual_Inspection/Rev0/31405886.003-003-RPT-0-2023_Annual_Inspection_12DEC23.docx

Figures

LEGEND

8 PHOTO LOG LOCATION

REFERENCE(S)

1. AERIAL IMAGERY: ESRI PROVIDED BASEMAP SERVICE. VIVID. MAXAR. IMAGERY CAPTURED 3/14/2022.

CLIENT
NEBRASKA PUBLIC POWER DISTRICT
GERALD GENTLEMAN STATION

PROJECT
PHOTO LOG 2023

TITLE
PHOTO LOG LOCATIONS

CONSULTANT

YYYY-MM-DD	2023-12-08
DESIGNED	RHG
PREPARED	RHG
REVIEWED	----
APPROVED	----

PROJECT NO.
31405886.003

FIGURE
1

APPENDIX A

Inspection Photographs

Gerald Gentleman Station Photolog

Photo Location 1	
	**IMG_3124.JPG** Site access gate

Photo Location 2	
	**IMG_3132.JPG** Area of erosion on south side of Ash Landfill No. 3

Gerald Gentleman Station Photolog

Photo Location 3	
	**IMG_3133.JPG** Perimeter road and sump risers

Photo Location 4	
	**IMG_3130.JPG** Internal contact water containment berm

Gerald Gentleman Station Photolog

Photo Location 5	
	**IMG_3156.JPG** Center pivot near active ash deposition area

Photo Location 6	
	**IMG_3153.JPG** Bottom ash stockpile area

Gerald Gentleman Station Photolog

Photo Location 7	
	**IMG_3147.JPG** Small animal burrow

Photo Location 8	
	**IMG_3150.JPG** Perimeter channel and exterior slope

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