AECOM Environment

Submitted to:
Basin Electric Power Cooperative
Antelope Valley Station
Beulah, ND

Submitted by:
AECOM
Fort Collins, CO
60635022
January 17, 2024

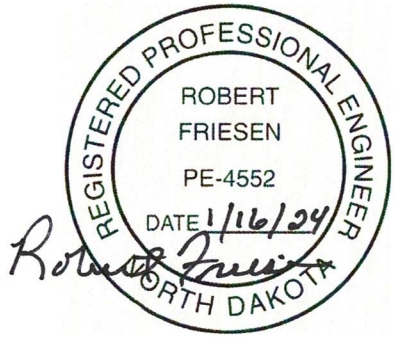
Basin Electric Power Cooperative Antelope Valley Station

Coal Combustion Residual Landfill Annual Inspection Report – 2023

Inspection Completed by:

I certify that this report has been prepared in accordance with 40 Code of Federal Regulations (CFR) 257.84(b)(2) requiring a written Annual Inspection Report prepared by a Qualified Professional Engineer (QPE) as set forth in the Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments for the Basin Electric Power Cooperative (BEPC) Antelope Valley Station (AVS) landfill for 2023.

Robert Friesen, P.E.
Sr. Project Manager
North Dakota PE #4552
Expires 12-31-2024



Contents

List of Figures

List of Attachments

Acronyms

AECOM	AECOM Technical Services, Inc.
AVS	Antelope Valley Station
BEPC	Basin Electric Power Cooperative
CCR	coal combustion residual
CFR	Code of Federal Regulations
FGD	flue gas desulfurization
NDDEQ	North Dakota Department of Environmental Quality
QPE	Qualified Professional Engineer

1.0 Introduction

1.1 Purpose and Definitions

In accordance with 40 Code of Federal Regulations (CFR) 257.84(b)(2), the purpose of this document is to fulfill the requirements for an Annual Inspection Report prepared by a Qualified Professional Engineer (QPE) to ensure the design, construction, operation, and maintenance of the Basin Electric Power Cooperative (BEPC) Antelope Valley Station (AVS) landfill is consistent with recognized and generally accepted good engineering standards.

AVS operates two lignite-fired boilers, resulting in the production of coal combustion residuals (CCRs). CCRs are defined in 40 CFR 257.53 as: "CCR means fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers."

CCRs generated at AVS (regulated under 40 CFR 257) include bottom ash, flue gas desulfurization (FGD) materials and fly ash.

1.2 CCR Production and Handling

On a daily average, approximately 1,600 tons of FGD materials, fly ash, and bottom ash are generated at AVS. The proportions of FGD, fly ash, and bottom ash are approximately 5%, 70%, and 25%, respectively. The moisture conditioned CCRs are transported by haul track approximately 2.3 miles to the offsite AVS CCR landfill, where the CCRs are dumped, spread, and compacted.

1.3 Facility Description

The area occupied by the landfill was originally permitted as part of the Coteau Properties Freedom Mine. The mining permit was revised in 1989 to allow an approximately 160-acre parcel to be set aside for use as a landfill. The site was permitted by the North Dakota Department of Health, now the North Dakota Department of Environmental Quality (NDDEQ), for solid waste disposal in 1995 under Permit SP-160. The location of the AVS landfill is presented in **Figure 1**. The first phase of liner construction was completed in 1996, with ash placement beginning the same year. The second phase of liner construction was completed in 2000, while the third phase of liner construction was completed and placed into service in 2008. The final phase of liner construction took place in 2015. In total, the four phases of liner construction encompass approximately 102.66 acres. The landfill underwent partial sequential closure in 2003, 2011, 2014, and 2016.

A lateral expansion of the landfill was permitted by the NDDEQ in early 2022. Construction of the first phase of the expansion was completed in 2023. AVS submitted a Construction Documentation Report to NDDEQ and received approval to begin placing waste in Cells 2A and 2B of the expansion area in a letter from NDDEQ dated December 22, 2023 (Dihle 2024).

2.0 Review of Existing Information

A review of existing facility records confirms the design, construction, operation, and maintenance of the landfill has been generally consistent with recognized and accepted good engineering standards.

2.1 CCR Unit Documents and Operating Records

Below is a list of documents reviewed with respect to the landfill:

- Engineer's Certification of Unstable Areas Demonstration, Existing CCR Landfill (AECOM Technical Services, Inc. [AECOM] 2018)
- Coal Combustion Residual Landfill Location Restrictions Demonstrations (Barr Engineering Co [Barr] 2022)
- Coal Combustion Residual Landfill Post-Closure Plan (BEPC 2016)
- Coal Combustion Residual Landfill Annual Inspection Report 2020 (BEPC 2021a)
- Coal Combustion Residual Landfill Annual Inspection Report 2021 (BEPC 2022)
- Coal Combustion Residual Landfill Annual Inspection Report 2022 (BEPC 2023)
- Coal Combustion Residual Landfill Run-on and Run-off Control Plan (Barr 2021)

2.2 Weekly Inspection Review

During 2023, qualified individuals (generally the AVS Environmental Coordinator) conducted weekly inspections for any appearance of actual or potential structural weakness and other conditions which were disrupting or had the potential to disrupt the operation or safety of the CCR unit. Appearances of structural weakness may include but are not limited to: (1) signs of piping and other internal erosion; (2) transverse, longitudinal, and desiccation cracking; (3) slides, bulges, boils, sloughs, scarps, sinkholes, or depressions; (4) animal burrows; (5) excessive or lacking vegetation cover; and (6) slope erosion. A review of the periodic inspection reports for the AVS CCR landfill indicated no signs of actual or potential structural weakness or other adverse conditions as described above. The completed weekly inspection checklists are filed in the operating record.

3.0 On-site Annual Inspection of Facility

The annual inspection was conducted on Tuesday, December 12, 2023, starting at 8:30 a.m. Central Standard Time. The weather was partly cloudy and approximately 13 degrees Fahrenheit. Thin snow cover was observed during the inspection visit.

Personnel in attendance for the inspection included:

- Robert Friesen, PE (ND #4552), AECOM Technical Services, Inc. (AECOM)

The completed annual inspection form is provided as **Attachment A**. A sample weekly inspection form used by AVS staff is provided as **Attachment B**. A photo log and figure showing photo locations for the December 12, 2023 inspection are included as **Attachment C**.

3.1 Findings

The total volume of CCRs present in the AVS landfill as of December 2023 is estimated to be approximately 14,652,000 cubic yards. Approximately 7,683,000 cubic yards of permitted airspace remain in the landfill; the increase in airspace was due to opening the new cell and calculation of a new final top of ash surface. The annual inspection revealed no appearance of actual or potential structural weakness of the CCR unit. No significant signs of distress or malfunction of the CCR unit were observed during the inspection and no changes have occurred that affect the stability or operation of the facility. Previously closed areas appeared to be well-vegetated and were graded in accordance with the NDDEQ solid waste landfill permit. Run-on and run-off were properly controlled, and no fugitive dust was evident. No excessive erosion or signs of major slope instability were observed. The design, construction, operation, and maintenance of the facility are consistent with recognized and generally accepted good engineering standards and industry practices.

4.0 Conclusions

As noted in the CCR Rules §257.84(b)(5), “If a deficiency or release is identified during an inspection, the owner or operator must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.”

4.1 Recommendations Other Than Normal Maintenance

No recommendations other than normal regular maintenance items were noted.

4.2 Deficiencies Discovered

No significant deficiencies or releases were noted as part of this annual inspection or document review.

4.3 Corrective Measures Taken

No corrective measures for significant deficiencies were noted that need to be taken by AVS as part of this annual inspection.

5.0 References

AECOM Technical Services, Inc. (AECOM). 2018. Engineer's Certification of Unstable Areas Demonstration, Existing CCR Landfill, EPA Final CCR Rule, Antelope Valley Station, Beulah, North Dakota. October 5.

Barr Engineering Co. (Barr). 2021. Coal Combustion Residuals Landfill Run-on and Run-off Control Plan, Antelope Valley Station Landfill. October.

Barr. 2022. Coal Combustion Residuals Landfill Location Restrictions Demonstrations, Antelope Valley Station Landfill Lateral Expansion. March.

Basin Electric Power Cooperative (BEPC). 2016. Coal Combustion Residual Landfill Post-Closure Plan, Basin Electric Power Cooperative, Antelope Valley Station. October.

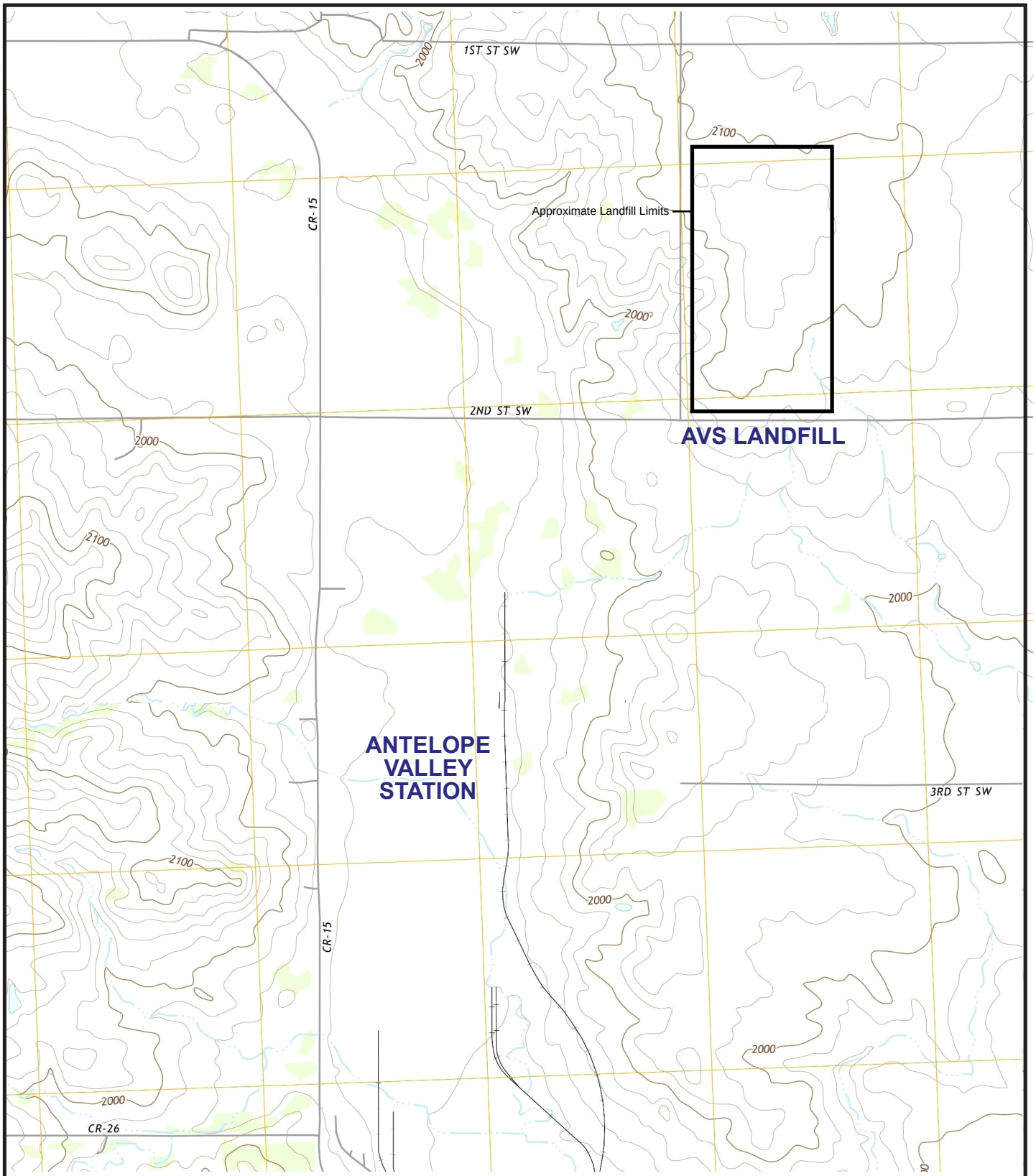
BEPC. 2021a. Coal Combustion Residual Landfill Annual Inspection Report 2020, Basin Electric Power Cooperative Antelope Valley Station. January.

BEPC. 2022. Coal Combustion Residual Landfill Annual Inspection Report 2021, Basin Electric Power Cooperative Antelope Valley Station. January.

BEPC. 2023. Coal Combustion Residual Landfill Annual Inspection Report 2022, Basin Electric Power Cooperative Antelope Valley Station. January.

Dihle, M. 2024. Personal Communication. January 4.

Figure



0 2,000 4,000

APPROXIMATE SCALE IN FEET

BASE MAP SOURCE: USGS 7½ minute topographic quadrangle maps: Beulah, North Dakota 2014; Beulah NE, North Dakota 2014.

ND

Quadrangle Location

BASIN ELECTRIC POWER COOPERATIVE

FIGURE 1
SITE LOCATION MAP
ANTELOPE VALLEY STATION LANDFILL

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Attachment A
2023 Federal CCR Annual Inspection Form

Federal CCR Annual Inspection Form

Station: AVS CCR Unit: Landfill

Date: 12/12/2023 Inspector(s): Bob Friesen

Weather Conditions: 13°F , partly cloudy Ground Conditions: thin snow, not muddy

Purpose of Inspection: Per the CCR Rule published by the USEPA and entered into the federal register on April 17, 2015, existing and new CCR landfills are required to be inspected annually by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR facility is in good condition and conforms to standard engineering practices for this type of facility.
Please refer to the attached figure to mark location of any identified conditions.

CCR UNIT FEATURE	Yes	No	NA	Location ID # or map identifier
CCR Placement				
1) Is waste being handled or placed differently than standard station practices?		X		
Bench Conditions				
2) Any signs of surface cracking?		X		
3) Any signs of depressions or sunken areas?		X		
Slope Conditions				
4) Any signs of surface cracking?		X		
5) Any signs of surface movement? If yes, please categorize		X		
5a) Sloughing (sliding of materials in sheets)		X		
5b) Sliding		X		
5c) Sinking		X		
6) Any signs of erosion rills greater than 3 inches?		X		Very minor erosion observed on North face of closed cell.
7) Any signs of erosion gullies greater than 6 inches?		X		
8) Any signs of holes or animal burrows?		X		
Haul Road Conditions				
9) Any obstructions?		X		
10) Any noticeable damage? If yes, please categorize		X		
10a) Rutting		X		
10b) Sinking		X		
10c) Pot holes		X		
Erosion Controls				
11) Any areas of active construction lacking erosion controls (silt fence)?		X		Disturbed areas have been seeded with erosion matting.
12) Any signs that existing erosion controls are not properly functioning?		X		
13) Any evidence of insufficient vegetative cover?		X		
Liner System Conditions (prior to CCR placement or during active liner construction)				
14) Any damage to liner protective cover?		X		Liner covered in new cell.
15) Any damage to liner system observed?		X		

Federal CCR Annual Inspection Form - CCR Landfills

Station: AVS CCR Unit: Landfill Date: 12/12/2023

CCR UNIT FEATURE	Yes	No	NA	Location ID # or map identifier
Leachate Collection/Detection System				
16) Any signs of obstruction to leachate collection/detection pipe outlets?		X		
17) Any signs of obstruction to leachate flow(s) to storage lagoon(s)?		X		
Surface Water Controls (Diversion Channels/Collection Channels/Sedimentation Ponds)				
18) Any signs of uncontrolled run-on to the landfill?		X		
19) Any signs of uncontrolled run-off from the landfill?		X		
20) Any signs of obstruction in surface water conveyance channels?		X		
21) Any cracking or separation in surface water conveyance channels?		X		
22) Any signs of heaving or sinking of surface water conveyance channels?		X		
23) Any signs of obstruction in culverts, drop boxes, or sumps?		X		
24) Any signs of sedimentation pond malfunction (excessive sediment buildup)?		X		
25) Any signs of excessive sedimentation pond water loss (leaking)?		X		
26) Any signs of obstruction to sedimentation pond outlet structure (in pond)?		X		
27) Any signs of obstruction to sedimentation pond effluent discharge?		X		
Fugitive Dust Controls				
28) Any evidence that fugitive dust controls are not being used?		X		
Other				
29) Any nontypical operations occurring at facility? If yes, please describe.		X		
30) Have weekly inspections been conducted by a qualified person?	X			
31) Did the weekly inspections indicate any appearances of structural weakness?		X		
32) Did the weekly inspections indicate any other conditions which are disrupting or have the potential to disrupt the operation and safety of the CCR unit?		X		
33) Have the weekly inspections been recorded in the facility's operating record?	X			New cell became operational in 2023.
34) Have there been any changes in geometry of the structure since the previous annual inspection?		X		
35) What is the approximate volume of CCR contained in the unit?				Average 2,300 tons per day

Additional Comments: N/A

Individual Completing Form: Bob Friesen (Print) Robert Friesen (Signature)

Attachment B
Sample AVS Weekly Inspection Form

Basin Electric Power Cooperative – Antelope Valley Station
SP-160 CCR Landfill
Periodic Inspection Checklist

Inspector: [signature] **Date:** 3/21/23

Landfill Standards: At intervals not exceeding seven days, inspect for any appearances of actual or potential structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit.

Yes	No	N/A	
	✓		1. Are there signs of piping and other internal erosion?
	✓		2. Are transverse, longitudinal, and/or severe desiccation cracks present?
	✓		3. Are slides, bulges, boils, sloughs, scarps, sinkholes, or depressions present?
	✓		4. Are there animal burrows?
	✓		5. Is any slope erosion present?

Actions taken to correct deficiencies (any question answered "Yes") or other comments:

CCR Fugitive Dust Standards: At intervals not exceeding seven days, inspect for CCR fugitive dust originating from CCR units, roads, and other CCR material management and material handling activities.

Yes	No	N/A	
✓			1. Is CCR dust minimized at landfill(s)?
✓			2. Is CCR dust minimized during ash loading and/or unloading activities?
✓			3. Is CCR dust minimized during ash transport and/or other handling?

Actions taken to correct deficiencies (any question answered "No") or other comments:

NDDoH Solid Waste Rule Compliance: Complete no less than weekly.

Yes	No	N/A	
✓			1. No unauthorized waste (appliances, household garbage, etc.) is present?
✓			2. Waste is periodically spread and compacted?

Actions taken to correct deficiencies (any question answered "No") or other comments:

Signature of Qualified Person: [signature] Title: Env. Coordinator

Attachment C
Photo Log of 2023 Annual Inspection

Last saved by: LILIANA.IGNAT(2024-01-10) Last Plotted: 2024-01-10 Project Management Initials: Designer: Checked: Approved: ANSI A 8.5" x 11"
Filename: \\na.aecomnet.com\lfs\AMER\FortCollins-USFCO4\Legacy\USFCO4FP001\Data2\WORKING\Basin Electric North Dakota\60635022 AVS Landfill 2020\500-Deliverables\2023AnnualCCRRPTs\Landfill\3_Attachments\AttC_PhotoLog\DWG\AVS CCR REPORT.DWG

Basin Electric Power Cooperative
Antelope Valley Station
Beulah, North Dakota
Project No.: 60635022 Date: 01/10/2024

Antelope Valley Station
Photo Map
December 12, 2023

AECOM

Attachment C

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Basin Electric Power Cooperative	Antelope Valley Station, Beulah, ND	60635022

Photo No.	Date:
1	12/12/23

Direction Photo Taken:

Southeast

Description:

Location: See Figure.

New landfill cell in the foreground with existing landfill cell in the background

Client Name:	Site Location:	Project No.
Basin Electric Power Cooperative	Antelope Valley Station, Beulah, ND	60635022

Photo No.	Date:
2	12/12/23

Direction Photo Taken:

East

Description:

Location: See Figure

Placement of ash in new landfill cell

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Basin Electric Power Cooperative	Antelope Valley Station, Beulah, ND	60635022

Photo No.	Date:
3	12/12/23

Direction Photo Taken:

Southeast

Description:

Location: See Figure

Existing landfill cell

Client Name:	Site Location:	Project No.
Basin Electric Power Cooperative	Antelope Valley Station, Beulah, ND	60635022

Photo No.	Date:
4	12/12/23

Direction Photo Taken:

Northwest

Description:

Location: See Figure

Closed landfill cell

PHOTOGRAPHIC LOG

Client Name: Basin Electric Power Cooperative	**Site Location:** Antelope Valley Station, Beulah, ND	**Project No.** 60635022

Photo No. **5**	**Date:** 12/12/23

Direction Photo Taken:

Northwest

Description:

Location: See Figure

Vegetation on leachate collection pond dike

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Basin Electric Power Cooperative	Antelope Valley Station, Beulah, ND	60635022

Photo No.	Date:
6	12/12/23

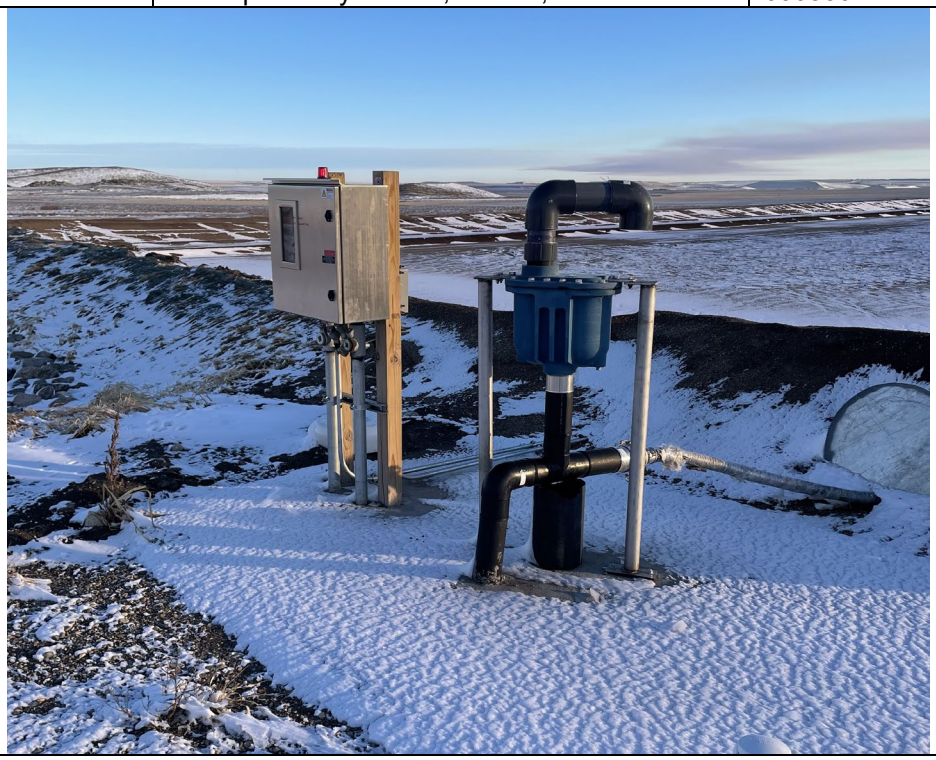
Direction Photo Taken:

Northeast

Description:

Location: See Figure

Leachate collection system instrumentation



Client Name:	Site Location:	Project No.
Basin Electric Power Cooperative	Antelope Valley Station, Beulah, ND	60635022

Photo No.	Date:
7	12/12/23

Direction Photo Taken:

Northwest

Description:

Location: See Figure

New landfill cell