INTRADEPARTMENTAL MEMORANDUM

FILE: Basin Electric Power Coop - Leland Olds Station (0143)

TO: Charles R. Hyatt, Director
    Division of Waste Management

THROUGH: Diana A. Trussell, Manager
          Solid Waste Program
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SUBJECT: Permit Application Review

DATE: June 24, 2022

Introduction

On April 19, 2022, the North Dakota Department of Environmental Quality (Department) received a permit application for a modification for the Basin Electric Power Cooperative – Leland Olds Station's (Basin Electric) special waste landfill.

Basin Electric currently owns and operates a special waste landfill, regulated under Permit 0143 on approximately 577.5 acres located in Parcels 1, 2, 3, and 4 in Sections 31 and 32, Township 144 North, Range 84 West in Mercer County, ND. Full legal descriptions of the parcels are located in the Department's files. Parcel 4 is also identified as Tract I within various documents. Basin Electric is proposing to modify their permit to meet the requirements of North Dakota Administrative Code (NDAC) Chapter 33.1-20-08 for coal combustion residual (CCR) facilities. The facility was first permitted in 1992.

Design

The facility controls access through lockable gates. A single crossing on ND Highway 200A leads to the landfill and surface impoundment under current Permit 0143. This private access road also has a lockable gate, and the access road is maintained by the facility. The landfill is approximately 3.5 miles southwest of the Leland Olds Station on land owned by Basin Electric. A small building is located on the southeast side of the landfill. The surface impoundment is located west of the landfill expansion area.

The landfill is located in an area of the previously reclaimed Glenharold Mine. Native topsoil and subsoil were used in the reclamation. The base of the landfill is underlain by approximately 20 feet of clay-rich mine spoils that overlay the Sentinel Butte Formation. This formation is
primarily comprised of dense clay with traces of fine sand and beds of lignite that typically range from seven to ten feet thick at the site.

The original landfill is located on the eastern side of the facility with the expansion phases moving from east to west. The facility is currently utilizing Cells 1A (north side) and 1B (south side). The last phase of the expansion will be in Cells 8A and 8B. The leachate impoundment is located west of the Phase 8 cells.

Run-on and run-off are controlled at the landfill. The landfill open areas are above the surrounding area, and stormwater (non-contact water) is diverted away from the active areas. Run-off from the active area is directed to the landfill leachate sumps by sloping the ash in that direction. The existing landfill sump has a capacity of approximately 11,098 cubic yards (yd³). Calculations, utilizing the 25-year/24-hour storm rainfall event and open area, show less capacity is required (10,974 yd³). The current expansion area sump has a capacity of approximately 53,119 yd³. This is able to accommodate a maximum of 19.62 acres. The current expansion area is 14.9 acres (Cells 1A and 1B). Temporary sumps will be utilized until the facility reaches Cells 5A and 5B where permanent sumps are planned. Run-off is treated as leachate and not discharged from the facility. The facility completes partial sequential closure projects as areas reach grade. This allows them to minimize the amount of open area and maintain adequate capacity in the sumps.

The expansion area base liner is a composite liner. It consists of two feet of compacted clay, with a minimum permeability of \(1.0 \times 10^{-7}\) centimeters/sec (cm/sec), and a 60-mil thick textured high-density polyethylene (HDPE) geomembrane. The geomembrane will be anchored along the top of the perimeter berm with an anchor trench. Exposed edges of the geomembrane will be protected with plywood and soil cover. As each new phase is constructed, the protective cover will be removed in order that additional geomembrane may be welded together to create the next cell(s).

The leachate collection system and is comprised of pipes, pumps and controls, liner and drainage layer, and the leachate evaporation impoundment. The construction specifications address the initial flush of the pipes. The pipes are also jet-cleaned annually or as needed based on facility staff inspections. Liquid collected from the cleaning is managed as leachate. The leachate pumps are removed and checked annually and cleaned as necessary. Head on liner is monitored during routine inspections when operation of the pumps and controls are checked. The leachate collection system is designed to maintain less than 12 inches head on liner as required by the solid waste rules. The leachate impoundment also has a liner and is required to have a minimum freeboard of two feet.

Environmental monitoring systems include the leachate collection system and the groundwater monitoring network. Sampling is discussed later in this memo.

**Operation**

The solid waste management units include a special waste landfill and a surface impoundment. The landfill accepts wastes only from the facility. The primary waste type is CCR, which includes fly ash, bottom ash, boiler slag, and flue gas desulfurization (FGD), a synthetic form of gypsum. The landfill also accepts other wastes from the facility. A complete list of these wastes can be found in the facility's Plan of Operations. The landfill does not accept food or other putrescible wastes, sludges or liquids, hazardous or infectious wastes. The facility utilizes off-road end dump haul trucks to move the wastes from the facility to the landfill. They have
capacities of 30, 40, and 70 tons which allow the facility to quantify waste amounts for the records and reporting requirements. The surface impoundment accepts leachate from the landfill for management via evaporation.

The Plan of Operations outlines operating procedures, routine maintenance, routine monitoring, emergency response, inspections, reporting, and record-keeping for the facility. The operating procedures section further identifies personnel and equipment, training, access/security, waste acceptance and handling procedures, landfill development, nuisance controls, and weather contingency items. Additional information regarding the Plan of Operations and Contingency Action Plan is discussed later in this memo.

Recordkeeping and reporting items are included in the Plan of Operations. The operating record is kept at the Bismarck, ND office of the environmental manager for Basin Electric Power Cooperative. Annual reports must be completed and submitted to the Department by March 1st each year and cover the previous year's information.

The FGD process at the facility generates synthetic gypsum (calcium sulfate dihydrate). A beneficial use request for agricultural use as a soil amendment and nutrient source within North Dakota was approved, with conditions, by the Department on April 5, 2019. The beneficial use approval remains in effect until April 5, 2024, unless modified, superseded, or revoked. In 2021, approximately 9,107 tons of FGD gypsum was utilized as an agricultural fertilizer and soil amendment in North Dakota.

**Closure**

The Landfill Closure Plan identifies some variables related to the closure of the landfill. The original landfill footprint is underlain by a compacted clay bottom liner system and the lateral expansion area in underlain by a composite bottom liner system. This requires two distinct cover system designs for the facility.

The cover system over areas underlain by the compacted clay bottom liner system will have a minimum two-foot-thick clay-rich barrier compacted to $1 \times 10^{-7}$ cm/second or less to minimize infiltration. An additional minimum two feet of cover materials will be placed over the compacted barrier. These depths exceed the minimum cover requirements. Slopes will range from approximately 3% to 15%, which is consistent with the solid waste rules.

The cover system over areas underlain by the composite bottom liner system will have an 18-inch compacted clay buffer soil layer overlain by a 40-mil linear low-density polyethylene (LLDPE) textured geomembrane, a 12-inch-thick subsoil rooting zone layer, and a six-inch thick SPGM layer. This meets the minimum cover requirements. Ancillary features include diversion berms (25% slopes), ditches, piping, manholes, and other relevant surface water management structures (i.e., detention ponds located on the north, south, and west sides of the of the expansion area). These elements tie into the areas adjacent to the facility management units. Slopes will also range from approximately 3% to 15%, which is consistent with the solid waste rules.

Soil preparation and seed mix selection are critical to vegetation establishment which stabilizes the soil and enhances evapotranspiration. Previous reclamation efforts for the Glenharold Mine utilizing the native soils have illustrated that appropriate soil preparation and seed mix selection can create an established vegetative cover despite the poorer quality of the existing native soils. Reports suggest that subsoils at the site that meet Department criteria for SPGM may not be
present in sufficient quantities. Also, as stated before, the facility will import, as needed, soils to meet specifications. Additional information on soils for closure can be found in d. Soil survey and segregation of suitable plant growth material section of this memo. According to the Landfill Closure Plan, once the final cover material (rooting zone and SPGM layers) has been placed, it will be chisel-plowed to a depth of six to eight inches. Fertilizer is then broadcast and chisel-plowed to a depth of two to three inches. The areas will be seeded with shallow-rooted native vegetation. After seeding the areas will be mulched and crimped at a rate of 3 tons/acre. Closed areas of the landfill will not be used for cultivated crops, heavy grazing, or any other use that might disturb the protective cover system. Once closed, the postclosure care period will continue for 30 years or as required by the permit.

The leachate impoundment closure will occur during the postclosure period. This is a non-CCR, clean-closed impoundment. Closure timing will be coordinated with the Department when the leachate production reaches a de minimus amount. The pumps and control system will be removed first. Any remaining leachate in the impoundment will be allowed to evaporate and/or removed mechanically. The liner will be removed and disposed of off-site at an appropriately classified and permitted facility. The impoundment sidewall will be breached, and the area graded to drain. The area will then have SPGM placed and be seeded and mulched.

Additional information on closure and postclosure can be found in m. Demonstrations of capability to fulfill the closure standards and n. Demonstrations of capability to fulfill the postclosure standards sections of this memo.

**Compliance History**

The following items of noncompliance have been noted since 2017:

- The Department sent a Letter of Apparent Noncompliance (LOAN), dated December 30, 2020, regarding some steep edge slopes, a fencing/access issue for the impoundment, an erosion concern area on the eastern edge of the original landfill, and dust control.

The above items of noncompliance have been appropriately addressed by the facility, and no formal notices of violations have been issued to the facility.

**Solid Waste Management Rules (NDAC Article 33.1-20)**

**NDAC Section 33.1-20-02.1-05. Record of notice.**

A copy of the record of notice provided for the 2011 expansion area and illustrating the existing landfill, dated January 5, 2011, was provided to the Department on May 3, 2022.

**NDAC Section 33.1-20-02.1-06. Property rights.**

Copies of the Warranty Deeds are located in the Department files.

**NDAC Section 33.1-20-03.1-01. Preapplication procedures.**

A preapplication was approved for the facility in 1992. When the facility proposed to expand, another preapplication for the expansion area was approved in 2010. As the facility is not proposing any expansions with this permit application, no additional preapplications are needed at this time.
NDAC Section 33.1-20-03.1-02. Permit application procedures.

NDAC Subsections 33.1-20-03.1-02(1) – (3)

The permit application included the ‘Application for a Solid Waste Management Facility Permit’ form SFN 19269. The permit application and form was prepared and signed by the applicant’s authorized agent. A hardcopy and digital copy of the application was provided to the Department on April 19, 2022. An application processing fee of $23,000 was included with the permit application.

NDAC Subsection 33.1-20-03.1-02(4)

A public notice by the facility is not required for this permit modification as the permit modification was at the request of the Department.

NDAC Subsection 33.1-20-03.1-02(5)

All areas related to the solid waste permit have already been released from the North Dakota Public Service Commission.

NDAC Subsection 33.1-20-03.1-02(6)

Applications for a solid waste management unit or facility permit must include the following information where applicable:

a. A completed application form, subsection 1;

   The permit application included the ‘Application for a Solid Waste Management Facility Permit’ form SFN 19269. The permit application and form was prepared and signed by the applicant’s authorized agent. A hardcopy and digital copy of the application was provided to the Department on April 19, 2022. An application processing fee of $23,000 was included with the permit application.

b. A description of the anticipated physical and chemical characteristics, estimated amounts, and sources of solid waste to be accepted, including the demonstration required by North Dakota Century Code section 23.1-08-14;

   The permit application included the following to address this item: Plan of Operations and Engineering Report.

   The facility is not open to the public and only accepts wastes produced at the facility. Per the Plan of Operations, up to 500,000 tons of waste is anticipated annually. CCR is the primary waste type with other waste types, such as construction materials, earthen materials, and spent resin from water plant demineralization, also included. A complete list of other waste types is located in the Plan of Operations.
c. The site characterization of section 33.1-20-13-01 and a demonstration that the site fulfills the location standards of section 33.1-20-04.1-01;

The permit application included the following to address this item: Site Characterization Report; Location Restrictions Report; and the Groundwater Monitoring System Report.

The landfill site is located approximately 3.5 miles southwest of the facility which is south of the Missouri River and its floodplain. It is in a rural setting with no nearby towns and therefore no wellhead protection area(s). A One-Call noted that there are no utilities in the area.

Surface water precipitation supplies perennial and ephemeral streams which flow in a general north-northeasterly direction to the Missouri River. Alderin Creek is located just north of the landfill area and is the only named waterway near the landfill. It discharges into the Missouri River.

While the mine reclamation originally created some ponds for use as a livestock water source, no livestock wells were identified in the documents.

A wetlands study determined that four wetlands delineated within the site were formed following the mine land reclamation when placed soils settled or as a result of road construction.

According to the Location Restrictions Report, a desktop analysis and literature search was performed and showed that there were seven threatened and endangered species of concern with potential to occur within the site area. Each species was assigned a determination effect as part of the analysis. The determinations ranged from "no effect" to "may effect, but not likely to occur".

According to the Groundwater Monitoring System Report, the uppermost aquifer is found within the seven-foot to ten-foot-thick unmined lignite bed located at depths ranging from approximately 85 to 140 feet below the ground surface. Groundwater flows from the southern portion of the landfill in a general north-northeasterly direction. Potentiometric surface of the uppermost groundwater within the lignite is at a depth of approximately 1847 feet above mean sea level in the southern portion of the landfill and 1837 feet above mean sea level in the northern. Hydraulic conductivity typically ranges from $10^{-6}$ to $10^{-8}$ cm/sec.

d. Soil survey and segregation of suitable plant growth material;

The permit application included the following to address this item: Soil Survey Report.

The landfill is located in an area of the previously reclaimed Glenharold Mine which complicated the detailed soil survey of the site. While native topsoil and subsoil were used in the reclamation, the native soils in the area were predominantly saline/sodic and sodic in their natural state. These types of soils typically would not meet suitable plant growth material (SPGM) subsoil
criteria for sodium adsorption ratio (SAR) and in some cases electrical conductivity (EC). Criteria for SPGM are outlined in the Department's Guideline 26. According to the Soil Survey Report dated March 2017, the data shows there is sufficient SPGM topsoil on the site. The report further shows the SPGM subsoil quantities which meets the Department's criteria, are insufficient. However, previous reclamation efforts at the Glenharold Mine utilizing the native soils have illustrated that appropriate soil preparation and seed mix selection can create an established vegetative cover despite the poorer quality of the existing native soils. Additional information regarding the soil preparation can be found in I. Demonstrations of capability to fulfill the closure standards section of this memo.

Soil stockpiles for landfill use are located between the leachate impoundment (west of the landfill) and the landfill itself. Signs identify the stockpiles. Additional soils are also imported from off-site as necessary to meet construction specification requirements.

e. Demonstrations of capability to fulfill the general facility standards of section 33.1-20-04.1-02;

The permit application included the following to address this item: Compliance Guide.

The Compliance Guide identifies the documents related to the various sections of the application. These documents cover training, water protection provisions, air quality standards, fugitive dust, signage, and facility inspections and are discussed throughout this memo.

f. Facility engineering specifications adequate to demonstrate the capability to fulfill performance, design, and construction criteria provided by this article and enumerated in this subdivision;

1) Transfer stations and drop box facilities, section 33.1-20-04.1-06.

The requirements of this section are not applicable as the facility is not proposing a transfer station or a drop box facility.


The requirements of this section are not applicable as the facility is not proposing to manage any waste piles.

3) Resource recovery, section 33.1-20-04.1-08.

The requirements of this section are not applicable as the facility is not proposing any resource recovery activities.
4) **Land treatment, section 33.1-20-04.1-09 and chapter 33.1-20-09.**

The requirements of this section are not applicable as the facility is not proposing a land treatment facility.

5) **Non-CCR surface impoundments, section 33.1-20-04.1-09 and chapter 33.1-20-08.1.**

This facility permit has a single, non-CCR surface impoundment. It has a two-foot clay liner compacted to a maximum permeability of $1.0 \times 10^{-7}$ cm/sec as required by the solid waste rules. Above the clay layer is a textured 60-mil HDPE geomembrane that is anchored to the perimeter berm. The impoundment manages the leachate via evaporation. The required minimum two feet of freeboard is monitored during routine inspections. Inspection frequencies are outlined in the Plan of Operations. Contingencies and emergency actions are outlined in the Landfill Contingency Action Plan.

6) **Any disposal, section 33.1-20-04.1-09.**

The requirements of this section are addressed in the application and are discussed throughout this review.

7) **Inert waste landfill, chapter 33.1-20-05.1.**

The requirements of this section are not applicable as the facility is not proposing an inert waste landfill.

8) **Municipal waste landfill, chapter 33.1-20-06.1.**

The requirements of this section are not applicable as the facility is not proposing a municipal waste landfill.

9) **Industrial waste landfill, chapters 33.1-20-07.1 or 33.1-20-10.**

The requirements of this section are not applicable as the facility is not proposing an industrial waste landfill.

10) **TENORM waste landfill, chapters 33.1-20-07.1 or 33.1-20-10 and 33.1-20-11**

The requirements of this section are not applicable as the facility is not proposing a TENORM waste landfill.

11) **Special waste landfill, chapter 33.1-20-07.1;**

The requirements of this section are not applicable as this is a CCR landfill.
12) **CCR unit, chapter 33.1-20-08:**

The facility has a CCR landfill unit.

**Location Standards**

The permit application included the following to address this item: *Site Characterization Report; Location Restrictions Report; and Groundwater Monitoring System Report.*

The minimum subgrade elevation of the proposed ash landfill expansion is 1883 feet NAVD29. Groundwater elevation data from September 2016 range from 1836.0 and 1862.8 feet NAVD29. This provides separation distances from 20.2 feet to 47.0 feet which exceeds the minimum five feet distance above the upper limit of the uppermost aquifer. This was certified by a registered North Dakota Professional Engineer (PE) on November 20, 2017.

A wetlands study determined the four wetlands delineated within the site area were non-relatively permanent waters. Non-relatively permanent waters are formed by geomorphic position, are isolated from jurisdictional waters, and appear without any significant nexus. Essentially, they were formed following the mine reclamation when soils settled or as a result of road construction. The executive summary of this report does recommend an official jurisdictional determination from the United States Army Corps of Engineers (USACE) be obtained for the areas in question. This was certified by a registered North Dakota PE on November 20, 2017.

Fault area research did not indicate the presence of active faults within 1000 meters (~3281 feet) of the landfill. This exceeds the minimum setback of 60 meters (~200 feet) in the solid waste rules. This was certified by a registered North Dakota PE on November 20, 2017.

The peak ground acceleration calculation for the landfill expansion area is below 0.1g meeting the criteria defined and confirming the expansion area is not located in a seismic impact zone. This was certified by a registered North Dakota PE on November 20, 2017.

A geotechnical analysis was performed for the landfill expansion area. Based on the soil encountered and the geotechnical analysis performed, the expansion is considered to be stable. This was certified by a registered North Dakota PE on November 20, 2017. A separate document, on the facility's CCR website, found the existing landfill also was not located in an unstable area. This was certified by a registered North Dakota PE on October 5, 2018.
Design Criteria

The permit application included the following to address this item: Design Criteria for Lateral Expansion; Construction Certification; Landfill Run-on and Run-off Control Plan; Landfill Plans Permit Set; Landfill Specifications; QA/QC Plan; Plan of Operations; and Engineering Report.

Design criteria was provided for the composite liner and leachate collection system. Each section was certified by a registered North Dakota PE on November 20, 2017.

The Cell 1 Construction Certification Report was approved by the Department on June 13, 2018. The expansion area base liner is a composite liner consisting of two feet of compacted clay, with a minimum permeability of $1.0 \times 10^{-7}$ cm/sec, and a 60-mil textured HDPE geomembrane.

Operating Criteria

The permit application included the following to address this item: Landfill Run-on and Run-off Control Plan; Fugitive Dust Control Plan; Plan of Operations; and Contingency Action Plan.

The Fugitive Dust Control Plan Revision 1 provided with the permit application is dated December 2017 and was certified by a registered North Dakota PE on December 1, 2017. The plan identifies the annual report will be placed in the operating record by December 1st each year and the appropriate agencies will be notified.

Run-on and run-off controls are discussed in detail in the Design section of this memo. This plan was certified by a registered North Dakota PE on January 13, 2018.

Various inspection types are outlined in the Plan of Operations and discussed throughout this memo.

Ground Water Monitoring and Corrective Action

The permit application included the following to address this item: Groundwater Monitoring System Report, and Sampling and Analysis Plan. This section applies to the CCR landfill.

A groundwater monitoring plan (CCR Groundwater Monitoring System Report) dated October 17, 2017 was submitted to the Department. The 2021 annual groundwater monitoring report was posted to the publicly accessible internet site on January 31, 2022. It contains a Monitoring System Certification and a Statistical Method Certification both certified by a registered North Dakota PE on October 17, 2017.
Groundwater monitoring systems: The landfill is located in clay rich mine spoil material that overlays the Sentinel Butte Formation. The uppermost aquifer is found within the seven-foot to ten-foot-thick unmined lignite bed in the formation and groundwater flows from the southern portion of the landfill in a general north-northeasterly direction.

Eleven monitoring wells were installed around the original landfill in 2016. Wells MW-2016-1 through MW-2016-8 were constructed of two-inch diameter, schedule 40 polyvinyl chloride (PVC) riser pipe and slotted screen. Wells MW-2016-9 through MW-2016-11 were constructed of four-inch diameter, schedule 40 PVC riser pipe and slotted screen. Well construction and development are further detailed within the plan. All except well MW-2016-7 (excluded from network) were screened in lignite layers within the Sentinel Butte Formation. MW-2016-1 is excluded from the network due to insufficient water production for sampling. Of the remaining wells, five are considered background (upgradient) and four are considered downgradient. This exceeds the minimum number of wells required (one upgradient and three downgradient).

Groundwater sampling and analysis: The sampling and analysis plan outlines field procedures, groundwater sampling, sample packaging and shipment, chain of custody, purge water management, analytical program (list of analytes, analytical methods, and testing), and quality assurance and quality control.

Detection monitoring program: Detection monitoring will be performed semiannually. Statistical analysis is performed on the data. The list of constituents is specified in the sampling and analysis plan.

Assessment monitoring program: Assessment monitoring is outlined in the sampling and analysis plan. If a statistically significant increase (SSI) over background becomes evident, two different scenarios come into play for continued groundwater monitoring. The first evaluates the source to determine if the SSI is from the landfill or potentially from another source. The second would establish an Assessment Monitoring Program if the SSI is a constituent concentration. Reporting and implementation of the Assessment Monitoring Program are further described in the sampling and analysis plan.

Assessment of corrective measures, the selection of remedy, implementation of a corrective action program, and corrective action procedures are not described in any detail as these are aspects that would need to be incorporated into an Assessment Monitoring Program which would be based on specific conditions at the site.
Closure and Postclosure Care

The permit application included the following to address this item: *Landfill Plans Permit Set; Landfill Specifications; QA/QC Plan; and Landfill Closure Plan.*

The Closure-Postclosure plan was prepared and certified by a registered North Dakota PE on March 23, 2017.

Landfill Closure Plan Revision 1 and Landfill Post-Closure Plan Revision 1 were both prepared and certified by a registered North Dakota PE on December 5, 2017.

Closure and Postclosure care are discussed in more detail later in this memo.

Recordkeeping, Notification, and Posting of Information to the Internet

The Plan of Operations outlines documents kept in the operating record and information provided to the Department in the annual reports. It further identifies the records that will be reported to the Department on a regular basis as required by the solid waste rules and the permit. Records will be maintained for a minimum of five years after the facility closes.

13) Municipal solid waste ash landfills, chapter 33.1-20-10;

The requirements of this section are not applicable as the facility is not proposing a municipal solid waste ash landfill.

14) Regulated infectious waste unit, chapter 33.1-20-12;

The requirements of this section are not applicable as the facility is not proposing a regulated infectious waste unit.

g. The plan of operation of section 33.1-20-04.1-03;

The permit application included the following to address this item: *Plan of Operations; and Contingency Action Plan.*

The facility provided a Plan of Operations, dated March 23, 2017, as part of the permit application. This is the same plan that was submitted as part of the 2017 permit renewal.

Waste acceptance: the facility is not open to the public and only accepts wastes from the facility that are approved by the Department.

Waste handling: Fly ash from the electrostatic precipitators is dry handled. All wastes are placed to maintain stability, drainage, dust control, and truck access in the landfill.
Facility inspection activities: The facility identifies regular facility inspections as well as inspections related to storm events (typically defined as one inch of rainfall or greater), and emergency response actions. A table identifies the different types of regular inspection frequencies.

Contingency actions: The plans identify contingencies related to emergency responses and other corrective actions. These items include fire, severe rainfall, dike/slope failure, leachate spill, grass fire, pump failure, vandalism, leachate head on liner build-up, leaks (surface water and groundwater contamination, damaged vegetation), liner damage, and excess leachate in pond. The facility also addresses nuisance control items including dust, vector, and litter control.

Leachate collection system: The leachate collection system and drainage layer are comprised of pipes, pumps, and the leachate evaporation impoundment. The pipes are jet-cleaned annually or as needed based on facility staff inspections. Liquid collected from the cleaning is managed as leachate. The leachate pumps should be removed and checked annually and cleaned as necessary. The leachate impoundment has a liner and is required to have a minimum freeboard of two feet.

Safety procedures: The plan does not contain a specific safety procedure section. Throughout the document it does identify safety items related to inclement weather, safety equipment, and safe operation of the CCR unit.

Sequential development: The Plan of Operations discusses sequential development of the filling of the landfill. Details are provided regarding the initial lift and protecting the new liner and granular drainage layer. According to the Landfill Closure Plan, partial sequential closure will commence in phases as areas within the landfill reach final grade. It is estimated that closure phases will occur every three to five years. Approximately 34.44 acres of the original landfill footprint (~68.09 acres) have been closed.

Special waste management procedure items include:

- **Generator and Hauler notification**: The facility is the sole generator of wastes at the landfill. Operators are trained in-house, must complete a written exam and must have at least 1,000 hours of operating experience. Any outside contractors utilized by the facility must complete 10 hours of training from the facility prior to providing any services.

- **Procedure to evaluate and inspect wastes for acceptance**: The facility is the sole generator of wastes for the landfill. Fly ash from the electrostatic precipitators is dry handled to alleviate concerns of liquid content. Rejecting a waste based on its volume or characteristics is not a concern as the facility has a list of specific wastes allowed and is able to divert any non-acceptable wastes at the source. No one hauls to the landfill that has not been trained by the facility.

- **Procedures for managing wastes**: Wastes are placed in the landfill to maintain stability, drainage, dust control, and truck access.
Equipment utilized includes conventional earthmoving equipment such as bulldozers, graders, and compactors. The facility utilizes off-road end dump haul trucks to move the wastes from the facility to the landfill.

- **Wastes not accepted**: The landfill does not accept food or other putrescible wastes, sludges or liquids, hazardous or infectious wastes.

**Facility inspection logs**: The plan identifies the records of operation, inspections, and monitoring results will be kept at the facility.

h. **Demonstration of the treatment technology of section 33.1-20-01.1-12**;

The requirements of this section are not applicable as the facility is not proposing to treat waste.

i. **The place where the operating record is or will be kept, section 33.1-20-04.1-04**;

The operating record is kept at the Bismarck, ND office of the environmental manager for Basin Electric Power Cooperative.

j. **Demonstration of capability to fulfill the groundwater monitoring, sections 33.1-20-08-06 or 33.1-20-13-02**;

The permit application included the following to address this item:

Groundwater Monitoring System Report; Sampling and Analysis Plan; Site Characterization Report.

More information on the groundwater monitoring system for the CCR landfill is discussed in **12) CCR unit, chapter 33.1-20-08** of this memo.

The permit application did not contain a groundwater monitoring plan for the non-CCR surface impoundment. The Department sent an e-mail to Basin Electric on May 17, 2022 requesting documentation on how groundwater monitoring is being addressed. Basin Electric provided a plan in a letter, dated June 8, 2022, and sent via e-mail to the Department on June 8, 2022.

Groundwater monitoring for the non-CCR surface impoundment is addressed in a letter that was sent to the Department on June 8, 2022. Additional wells were installed to the west of the original landfill permit area in late 2011, including wells MW2011-3, MW2011-4 and MW2011-5, which are screened in the Base of Spoils Aquifer (BOSA). Measured hydraulic conductivities for the new wells ranged from $2.5 \times 10^{-6}$ to $8.1 \times 10^{-5}$ cm/sec, with an average of $1.35 \times 10^{-5}$ cm/sec. The new wells were sampled at an increased frequency (quarterly) in 2012 and 2013 in order to establish baseline conditions. Drawing OCY-9567, included with the June 8, 2022 letter, depicts the monitoring well locations. Groundwater flows generally north to south in the BOSA; accordingly, wells MW2011-3 and MW2011-4 are proposed to serve as downgradient monitoring locations for the leachate evaporation pond while well MW2011-5 is proposed to serve as an upgradient monitoring location.
Downgradient wells MW2011-3 and MW2011-4 have historically had total dissolved solids (TDS) concentrations of approximately 2,000 mg/l, which is relatively low for spoil water. Upgradient well MW2011-5 has TDS concentrations in the 4,000 to 5,000 mg/l range, which is more typical for samples drawn from the BOSA. Arsenic concentrations have been above the maximum contaminant level (MCL) of 0.010 mg/l (average of 0.046 mg/l for 2019) for all samples taken from Well MW2011-5 since it was installed. Since no disposal had taken place in this area, the values observed are indicative of post-mining groundwater conditions.

Basin Electric proposes to utilize the groundwater monitoring plan (parameter list, sampling and analysis plan) that was previously approved by the Department during original site permitting and subsequent renewals. The groundwater monitoring plan was included with the June 8, 2022 letter.

**k. Construction quality assurance and quality control;**

The permit application included the following to address this item: Landfill Plans Permit Set; Landfill Specifications; and QA/QC Plan.

The QA/QC Plan outlines the procedures to document the liner and final cover construction activities. The plan also includes testing procedures and frequencies to produce the data/information needed for the construction certification report which must be submitted to the Department.

**l. Demonstrations of capability to fulfill the closure standards, section 33.1-20.1-04.1-05 and otherwise provided by this article;**

The permit application included the following to address this item: Landfill Plans Permit Set; Landfill Specifications; QA/QC Plan; and Landfill Closure Plan.

The Landfill Plans Permit Set and Landfill Specifications illustrate the ultimate design of the landfill and identify the requirements needed to complete construction of the various elements.

According to the Landfill Closure Plan, Revision 1 dated December 2017, partial sequential closure will commence in phases as areas within the landfill reach final grade. The area is surveyed, and grade stakes are placed to confirm elevations. It is estimated that closure phases will occur every three to five years.

The Landfill Closure Plan also identifies some variables related to the closure of the landfill. The original landfill footprint is underlain by a compacted clay bottom liner system and the lateral expansion area in underlain by a composite bottom liner system. This requires two distinct cover system designs for the facility.

The cover system over areas underlain by the compacted clay bottom liner system will have a minimum two-foot-thick clay-rich barrier compacted to $1 \times 10^{-7}$ cm/second or less to minimize infiltration. An additional minimum two
feet of cover materials will be placed over the compacted barrier. These depths exceed the minimum cover requirements. Slopes will range from approximately 3% to 15%, which is consistent with the solid waste rules.

The cover system over areas underlain by the composite bottom liner system will have an 18-inch compacted clay buffer soil layer overlain by a 40-mil linear low-density polyethylene (LLDPE) textured geomembrane, a 12-inch-thick subsoil rooting zone layer, and a six-inch thick SPGM layer. This meets the minimum cover requirements. Ancillary features include diversion berms (25% slopes), ditches, piping, manholes, and other relevant surface water management structures (i.e., detention ponds located on the north, south, and west sides of the of the expansion area). These elements tie into the areas adjacent to the facility management units. Slopes will also range from approximately 3% to 15%, which is consistent with the solid waste rules.

Justification for slopes steeper than 15% is required. On May 12, 2022, the Department contacted Kevin Solie of Basin Electric Power Cooperative requesting the justification as it was not included in the permit application. On May 13, 2022, Mr. Solie provided the soil loss equation information necessary to justify the use of slopes up to 25%.

Soil preparation and seed mix selection are critical to vegetation establishment which stabilizes the soil and enhances evapotranspiration. Previous reclamation efforts for the Glenharold Mine have demonstrated how soils that do not typically meet the criteria for SPGM are still able to establish vegetative cover. Also, as stated before, the facility will import, as needed, soils to meet specifications. According to the Landfill Closure Plan, once the final cover material (rooting zone and SPGM layers) has been placed, it will be chisel-plowed to a depth of six to eight inches. Fertilizer is then broadcast and chisel-plowed to a depth of two to three inches. The areas will be seeded with shallow-rooted native vegetation. After seeding the areas will be mulched and crimped at a rate of 3 tons/acre. Closed areas of the landfill will not be used for cultivated crops, heavy grazing, or any other use that might disturb the protective cover system.

Once final closure is completed, a record of notice will be filed with the County Recorder. It will identify any special conditions or limitations on the use of the property. A certified copy will be submitted to the Department.

The facility maintains the required closure financial assurance through a financial test/corporate guarantee mechanism which is adjusted annually for inflation and submitted to the Department each year.

m. Demonstrations of capability to fulfill the postclosure standards, section 33.1-20-04.1-09 and otherwise provided by this article; and

The permit application included the following to address this item: Landfill Post-Closure Plan; and Closure-Postclosure Plan.

Once closed, the postclosure care period will continue for 30 years or as required by the permit. The various postclosure activities are outlined in the
plans. Primary headings include inspections, maintenance, monitoring, and reporting. Facility inspections will be semi-annual. A table outlines key items to be inspected. Maintenance items noted during inspections will be addressed and completed within 30 days. Routine monitoring of the groundwater and leachate will continue through the postclosure period. Annual reporting to the Department will continue.

The leachate impoundment closure will occur during the postclosure period. This is a non-CCR, clean-closed impoundment. Closure timing will be coordinated with the Department when the leachate production reaches a de minimus amount. The pumps and control system will be removed first. Any remaining leachate in the impoundment will be allowed to evaporate and/or removed mechanically. The liner will be removed and disposed of off-site at an appropriately classified and permitted facility. The impoundment sidewall will be breached, and the area graded to drain. The area will then have SPGM placed and be seeded and mulched.

The facility maintains the required postclosure financial assurance through a financial test/corporate guarantee mechanism which is adjusted annually for inflation and submitted to the Department each year.

n. A disclosure statement as required by North Dakota Century Code section 23.1-08-17.

A disclosure statement that meets the requirements of this section was submitted to the Department on April 19, 2022.

Conclusion

Based on the submitted application and items discussed above, Basin Electric Power Cooperative has shown that the modification meets the requirements of the North Dakota Solid Waste Management Rules. It is proposed that the Department grant Basin Electric Power Cooperative a permit with the conditions listed in Permit 0143. The proposed permit length is for a period of 5 years because the current permit is set to expire on June 28, 2027 and this permit addresses new requirements for CCR facilities.

CRH:DAT:AJD
Attachment