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INTRADEPARTMENTAL MEMORANDUM

FILE: Coal Creek Station (Ponds and Landfill) (0033)

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SUBJECT: Permit Renewal Application Review

DATE: October 19, 2026

Introduction

The North Dakota Department of Environmental Quality (Department) received a permit application for a renewal for Rainbow Energy Center – Coal Creek Station's (Rainbow) Coal Combustion Residual (CCR) landfill, CCR surface impoundments, and non-CCR surface impoundments

Rainbow currently owns and operates a CCR landfill, several CCR surface impoundments, and several non-CCR surface impoundments, regulated under Permit 0033, on approximately 320 acres located in Sections 16 and 17, Township 145 North, Range 82 West in McLean County, ND. Rainbow is proposing to renew their permit to continue solid waste activities at the facility. The facility was first permitted in 1983.

Design

The Drains Pond System encompasses approximately 30 acres including the east cell (a non-CCR surface impoundment) and the west and center cells (CCR surface impoundments). A connected series of surface impoundment cells (west, center, and east cells) are used to dewater bottom ash and economizer ash and clarify processes water for reuse. The east cell liner consists of an upper component of 40-mil thick high-density polyethylene (HDPE) geomembrane liner, and a lower component of a minimum of 2 feet of compacted clay. The west cell of the drains pond has a bottom liner consisting of the following (from bottom to top): 2 feet of compacted clay, 60-mil HDPE geomembrane liner, geocomposite drainage layer,

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geosynthetic clay liner (GCL), 60-mil HDPE geomembrane liner, and 2 feet of protective cover. The center cell of the drains pond system has a bottom liner consisting of 2 feet of compacted clay, 60-mil HDPE geomembrane liner, and 2 feet of protective cover.

Upstream Raise 91 is a surface impoundment that will be closed with waste in place and encompasses approximately 85 acres. Upstream Raise 91 primarily has a liner system consisting of an upper component of 40-mil thick HDPE geomembrane liner, and the lower component consisting of a minimum of 2 feet of compacted clay. In 2016, an additional 7 acres of composite liner was installed in the southeast corner of the surface impoundment and is composed of a 60-mil HDPE geomembrane liner, underlain by a GCL. Upstream Raise 91 maintains a series of leachate collection pipes, that drain to a sump located in the northeast corner of the unit. Cross over pipes are located in the northwest corner of the unit which connects Upstream Raise 91 to the Drains Pond System, which is the primary method for dewatering the unit.

Upstream Raise 92 is a surface impoundment that will be closed with waste in place and encompasses approximately 125 acres. The west side of the Upstream Raise 92 liner system consists of an upper component of 40-mil thick HDPE geomembrane liner, and a lower component of a minimum of 2 feet of compacted clay. Approximately 34 acres on the east side of Upstream Raise 92 is lined with an upper component of 60-mil thick linear low density polyethylene geomembrane line (LLDPE), and a lower component of a minimum of 1 foot of compacted low hydraulic conductivity soil, approximately 25 to 65 feet of stratified and compacted CCR materials, and approximately 15 to 30 feet of natural clay liner.

The Southeast Section 16 landfill encompasses approximately 80 acres and approximately 61 of those acres are lined. The unit has a composite liner composed of two feet of low permeability soil liner overlain by 60-mil HDPE geomembrane, and nonwoven geotextile.

Operation

Rainbow operates four CCR units which are: Upstream Raise 91, Upstream Raise 92, the Drains Pond System (west and center cells) and the Southeast Section 16 Landfill. They are CCR surface impoundments used for the handling and deposition of CCR including but not limited to fly ash, bottom ash, economizer ash, flue gas desulfurization (FGD) generated at Rainbow's Coal Creek Station. Upstream Raise 91 receives FGD that is sluiced out of the power plant. FGD settles in Upstream Raise 91, and process water is returned to the plant. Upstream Raise 92 is currently undergoing closure and does not receive any waste. The Drains Pond System consists of three cells, two of which are used for sluicing, and settlement of CCR that is then sluiced out of the plant process water. Flow first enters the west cell where most of the solids settle and are dredged out for disposal. The center cell further clarifies process water. The east cell is a non-CCR surface impoundment which is primarily used for storage of process water.

The Southeast Section 16 landfill is a CCR landfill used for the handling, and disposal of CCR, inert waste, and other waste generated at Coal Creek Station as listed in the waste acceptance plan. Bottom ash is currently being stockpiled in the landfill for future processing and offsite beneficial use. The landfill has a designated area for the disposal of inert waste material generated at the plant. The landfill's contact water area is a non-CCR surface impoundment used for collection of contact water, and leachate from the landfill. Rainbow submits an annual report to the Department describing the handling and disposal of all waste material generated at the facility.

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The plant operates 24 hours per day, 7 days per week, meaning waste may be placed in the active units at any time. CCR and other waste material generated at the facility is collected, handled, and loaded through various mechanisms as described in the plan of operations prior to transportation to Upstream Raise 91, or the Southeast Section 16 landfill for disposal or further processing. Weekly inspections of the 4 CCR units will continue to be performed throughout the operational life of the units by trained staff utilizing approved inspection logs. All completed logs are filed in the operating record. Annual inspections of the CCR units to evaluate the structural performance of the units are conducted by registered Professional Engineers in the State of North Dakota.

The facility has a groundwater monitoring network which is detailed in their groundwater monitoring plan. The plan identifies upgradient, and downgradient wells that monitor each of the units, monitoring schedule, parameters, statistical analysis approach, and reporting requirements. Rainbow submits an annual report to the Department that includes the results of the groundwater monitoring analysis. Rainbow maintains multiple contingency plans in the event there is an operational failure of any of the units, and/or extreme weather conditions that may affect any of the units. The contingency plans will be implemented to prevent, and limit the extents of personal, property, and environmental impacts

Closure

Drains Pond System

The west cell and center cell of the Drains Pond System will be closed by removal of CCR, the liner systems, and any underlying and surrounding contaminated soils. The east cell of the Drains Pond System will also be closed by removal including removing all standing liquids, waste, and waste residues, the liner systems, and any underlying and surrounding contaminated soils.

Upstream Raise 91

Upstream Raise 91 currently receives sluiced FGD and dry CCR until the design grades are met. After FGD sluicing is completed, free water will be decanted off the surface of the FGD and a cap of dry CCR or soil will be placed over the FGD. Upstream Raise 91 will be closed incrementally as CCR placement progresses, allowing for final and or temporary cover to be placed on outside slopes for dust control, and to allow shedding of non-contact stormwater. The surface of the final cover will have side slopes of up to 20% and a minimum of 3% along the top to promote surface water run-off. Terraces and down-chute channels will be installed on the final cover to provide adequate surface water control for a 24-hour, 100-year storm. Following final cover installation, vegetation will be established. The final cover design for Upstream Raise 91 is an alternative cover design utilizing an evapotranspiration (ET) final cover that has been previously approved by the Department. The ET final cover design consists of the following (from the top down)

- Six inches of topsoil that is capable of sustaining native plant growth
- Thirty inches of clay-rich, plant root zone soil, being compacted between 80%-95% the maximum dry unit weight as determined by a standard proctor test.

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Upstream Raise 92

Upstream Raise 92 was operated as a CCR surface impoundment which received sluiced FGD and dry CCR. Sluicing of FGD stopped in December 2020, with the final receipt of waste on April 10, 2021. A dry CCR cap was placed over the FGD material to promote surface water run-off, prevent pooling of water, and act as loading to assist in further consolidation and stabilization of the FGD. Drainage of the FGD will continue through the bottom ash perimeter drains and sumps within Upstream Raise 92. Seepage pipes within the perimeter drain collect and convey water to Upstream Raise 91. Settlement markers and piezometers are utilized to monitor settlement and consolidation. Significant settlement has occurred since the dry CCR cap placement and is expected to continue through the next few years. Once steady-state conditions are achieved, the final cover system, and surface water controls will be completed on top of Upstream Raise 92. The final cover system design, and surface water controls are consistent with the ET final cover as described previously for Upstream Raise 91. Following installation of the final cover, vegetation will be established.

Southeast 16

The primary closure activities for the Southeast Section 16 landfill include adjusting CCR grades as necessary, installing the final cover system, and establishing vegetation. The surface of the final cover will have side slopes of up to 25%, and a minimum slope of 3% along the top of Southeast Section 16 to promote run-off, prevent ponding of surface water, and allow for maintenance as needed. A soil inventory was previously performed for the facility and it identified several existing stockpiles, and several undeveloped locations containing adequate supply of soils suitable for use as cover material. The final cover system is consistent with the ET final cover as described previously for Upstream Raise 91 and Upstream Raise 92. Following installation of the final cover, vegetation will be established.

Compliance History

The following items of noncompliance have been noted since 2015:

- Incomplete financial assurance submittal for 2021

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 record of notice has been filed with the county recorder.

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

Warranty deeds for the property for which Rainbow Energy Center owns were included with the application. A land ownership map identifying any easements on the property was included with the application. A review of the North Dakota Parcel Viewer identifies that Rainbow Energy Center owns the property as mentioned in the permit application.

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

This application does not involve new or expanded solid waste management units, so a preapplication is not required. The most recent preapplication for this area was submitted in February 2015 for an 11.5-acre expansion for the Drains Pond System. No issues were noted in the review of the expansion.

NDAC Section 33.1-20-03.1-02. Permit application procedures.

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

A completed application form was included with the application. Printed and electronic copies were provided to the Department. The form included all of the required signatures. The application was prepared by WSP USA Inc.

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

A public notice by the facility is not required for a permit renewal and no major modifications are being proposed.

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

Notification to the North Dakota Public Service Commission is not required as the facility is not proposing to dispose of coal processing wastes in a mining permit area.

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;**

   A completed application form was included with the application. Printed and electronic copies were provided to the Department. The form included all of the required signatures. The application was prepared by WSP USA Inc.

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;**

   Only wastes generated at Rainbow's Coal Creek Station and others described in the waste acceptance plan are accepted for placement within the CCR units. The surface impoundments and landfill primarily accept CCR generated from Coal Creek Station including fly ash, bottom ash, economizer ash, and FGD. The facility also accepts other wastes generated at the plant including air jig rejects, pulverizer rejects, and inert waste. CCR from Great River Energy's (GRE) Spiritwood Station, and fly ash reclaimed from the Section 32 special waste landfill (Permit 0395) are also disposed of in the CCR units. Additional earthen materials (clay, sand, gravel) may be required during construction of the CCR units. Rainbow staff involved in the operation

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and management of the CCR units routinely inspect and monitor the materials that they are depositing as well as evaluate the potential for unauthorized waste disposal. There are no waste screening or profiling procedures for the CCR units covered within the plan of operations as the facility has very limited waste sources that are well characterized.

The placement for disposal of fly ash, and bottom ash within the CCR units ranges from 0-100,000 tons per year depending on the year. The placement rate for bottom ash reflects the portion of material that will be used for construction of Upstream Raise 91. All fly ash, and bottom ash produced at the plant is intended for beneficial use. Approximately 190,000 tons of FGD, 50,000 tons of air jig rejects, 24,000 tons of GRE's Spiritwood fly ash, and 5,000 tons of inert waste material are placed for disposal per year.

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;

Each of the four CCR units are required to follow additional location standards as specified by North Dakota Administrative Code (NDAC) Section 33.1-20-08-03. Those requirements are discussed in **12. CCR unit, chapter 33.1-20-08** of this review memo.

The 4 CCR units in this application have previously demonstrated compliance with the general location, and site characterization standards. The units have already been constructed and no changes are proposed as part of this permit renewal.

The units are not located within the specific list of excluded areas, including:

- An aquifer;
- A wellhead protection area;
- 100-year floodplain;
- Areas prone to differential settlement;
- Channels, ravines, or steep topography;
- Woody draws; and
- Critical habitats.

The units are not located within the specific list of potentially excluded areas, including:

- Over or adjacent to principal glacial drift aquifers;
- Close to a drinking water supply well;
- Near surface water or wetland;
- Within final cuts of a surface mine;
- Near a state or national park; and
- Near pipelines not associated with the operation of the units.

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

A soil inventory was performed for the facility and identified several existing stockpiles, and several undeveloped locations containing adequate supply of soils suitable for use as cover material. The locations of these stockpiles, and potential borrow sources are labeled and identified within the closure plans of the CCR units.

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

Permanent signs are located at each of the 4 CCR units indicating the name, permit number, name and telephone of the owner, wastes accepted, and any restrictions. Personnel involved in waste handling and operation of the Permit 0033 units are instructed on an annual basis in specific procedures to ensure compliance with permits, unit plans, and other regulations. Documentation of training is placed within the facility's operating record. The 4 units are inspected on a weekly basis by Rainbow personnel; the units are evaluated for compliance with freeboard, erosion, vegetation, settlement, surface water controls, and the presence of water or spillage.

Rainbow operates a zero-discharge operation; thus, no discharge of pollutants is expected to occur. Rainbow operates a groundwater monitoring program and further discussion on the groundwater monitoring program can be found in **12. CCR unit, chapter 33.1-20-08** of this review memo. Odor control is not a concern due to the relatively inert nature of CCR, however, the facility's personnel are instructed to monitor odor in the event that it does become a concern. Dust control is managed based on the facility's CCR Fugitive Dust Control Plan. Dust is minimized through specific collection, handling, loading, transporting, and placing practices as described in the fugitive dust control plan.

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.

2) Waste piles, section 33.1-20-04.1-07.

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.

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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.

The facility operates two non-CCR surface impoundments. The east cell of the drains pond system is used to store plant process water prior to returning to the plant. The Southeast Section 16 contact water area is used to collect runoff and contact water associated with the Southeast Section 16 Landfill. While the surface impoundments are in operation, freeboard will be monitored to ensure that they will have equal to or greater than two feet of freeboard to avoid overtopping from wave action or precipitation. On a monthly basis, and/or after significant storm events, the surface impoundments will be inspected for deteriorations, malfunctions and improper operations. If malfunctions occur, the units will be taken out of service and appropriate actions will be taken in the event that any release or environmental impacts occur. The Department will be notified within 24 hours after detecting the problem.

The Southeast Section 16 contact water area will be maintained throughout the postclosure period of the Southeast Section 16 Landfill. Once no longer needed, the surface impoundment will be closed by removal. The east cell of the Drains Pond System will also be closed by removal. Dependent on-site conditions and the status of other permitted units, the potential exists for the Drains Pond System to be closed with waste in place. If this occurs, Rainbow will request a major permit modification and provide updated closure plans, permit drawings, and postclosure plans as necessary.

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

Rainbow maintains multiple dozers, graders, water trucks, and haul trucks that are utilized for waste handling, placement, and loading activities for the 4 CCR units. Control of the waste deposition will be done utilizing global position systems (GPS). Rainbow operates both a handheld system, and systems integrated with the operation of dozers, and motor graders at the site to achieve and monitor final waste slopes and active faces. Water trucks are available on site to provide material conditioning prior to placement, and dust suppression. A soil inventory was performed for the facility and identified several existing stockpiles, and several undeveloped locations containing adequate supply of soils suitable for use as cover material. The locations of these

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stockpiles, and potential borrow sources are labeled and identified within the closure plans of the CCR units.
Stormwater management is currently operated under Rainbow's stormwater discharge permit, and stormwater pollution prevention plan (SWPPP). Surface waters that have not come in contact with process waters, or waste is considered clean and will be diverted away from the units. Surface water that has come in contact with the active area will be treated as contact water and managed appropriately in accordance with the rules. The adequacy of contact water controls to contain and convey runoff has been evaluated for a 100-year, 24-hour design storm event. Final surface water controls following closure have been designed, and evaluated for 100-year, 24-hour storm events. Closure plans for Southeast Section 16 landfill, Upstream Raise 91, and Upstream Raise 92 identify that no closure grades are going to exceed the maximum 25% requirement as specified by this section.

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 the facility is not proposing a special waste landfill.

12) CCR unit, chapter 33.1-20-08;

Location Standards

<u>Upstream Raise 91</u>

Upstream Raise 91 is an existing CCR surface impoundment and must meet the location standard requirements of placement above

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the uppermost aquifer, wetlands, fault areas, seismic impact zones, and unstable areas. The Location Restrictions Demonstration – Upstream Raise 91 details how the facility has met the requirements. Most of the Upstream Raise 91 footprint has a separation between the bottom of the composite liner and groundwater greater than 5 feet. A small area in the northwest corner indicates a minimum separation of approximately 3.5 feet as detailed in the Location Restrictions Demonstration – Upstream Raise 91 and the unit will be closing in the next few years. Upstream Raise 91 was constructed as an above-grade impoundment with grass covered perimeter earthen embankments and is located several hundred feet uphill of Samuelson Slough (closest surface water body). There are no visual indications suggesting the impoundment is located in wetlands. A map was provided identifying known quaternary faults located within the United States. No known faults are identified to be located within North Dakota. A map prepared by the USGS (Petersen, et al., 2014) shows the nationwide 2% probability in 50 years of exceedance of peak ground acceleration. On the map, the majority of North Dakota, including the facility, is given a 2% probability of exceeding 0.02 g in 50 years, which is below the 0.10 g threshold for defining a seismic impact zone. Foundation site soil conditions for Upstream Raise 91 do not indicate that the facility is located in an unstable area susceptible to significant differential settlement. Although commercial mining occurs in the vicinity of the facility, no prior mining has occurred within the footprint of the facility, or adjacent to the facility, that would undermine the stability of the facility.

Upstream Raise 92

Upstream Raise 92 is an existing CCR surface impoundment and must meet the location standard requirements of placement above the uppermost aquifer, wetlands, fault areas, seismic impact zones, and unstable areas. The Location Restrictions Demonstration – Upstream Raise 92 details how the facility has met the requirements. Most of the Upstream Raise 92 footprint has a separation between the bottom of the composite liner and groundwater greater than 5 feet. A small area on the north side of the west half of Upstream Raise 92 indicates a minimum separation of approximately 3.5 feet as detailed in the Location Restrictions Demonstration – Upstream Raise 92 and the unit will is currently undergoing closure. Upstream Raise 92 was constructed as an above-grade impoundment with grass covered perimeter earthen embankments and is located several hundred feet uphill of Samuelson Slough (closest surface water body). There are no visual indications suggesting the impoundment is located in wetlands. A map was provided identifying known quaternary faults located within the United States. No known faults are identified to be located within North Dakota. A map prepared by the USGS (Petersen, et al., 2014) shows the

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nationwide 2% probability in 50 years of exceedance of peak ground acceleration. On the map, the majority of North Dakota, including the facility, is given a 2% probability of exceeding 0.02 g in 50 years, below the 0.10 g threshold for defining a seismic impact zone. Foundation site soil conditions for Upstream Raise 92 do not indicate that the facility is located in an unstable area susceptible to significant differential settlement. Although commercial mining occurs in the vicinity of facility, no prior mining has occurred within the footprint of the facility, or adjacent to the facility, that would undermine the stability of the facility.

Drains Pond System

The Drains Pond System is an existing CCR surface impoundment and must meet the location standard requirements of placement above the uppermost aquifer, wetlands, fault areas, seismic impact zones, and unstable areas. The Location Restrictions Demonstration – Drains Pond System details how the facility has met the requirements. Most of the Drains Pond System footprint have a separation between the bottom of the composite liner and groundwater greater than 5 feet. A small area in the southwest corner of the east cell of the Drains Pond System indicates a minimum separation of approximately 3.0 feet, however the east cell is not a CCR unit and is not subject to these additional location restrictions. There are no visual indications suggesting the impoundment is located in wetlands. A map was provided identifying known quaternary faults located within the United States. No known faults are identified to be located within North Dakota. A map prepared by the USGS (Petersen, et al., 2014) shows the nationwide 2% probability in 50 years of exceedance of peak ground acceleration. On the map, the majority of North Dakota, including the facility, is given a 2% probability of exceeding 0.02 g in 50 years, below the 0.10 g threshold for defining a seismic impact zone. Foundation site soil conditions for the Drains Pond System do not indicate that the facility is located in an unstable area susceptible to significant differential settlement. Although commercial mining occurs in the vicinity of the facility, no prior mining has occurred within the footprint of the facility, or adjacent to the facility, that would undermine the stability of the facility.

Southeast Section 16 Landfill

The Southeast Section 16 Landfill is an existing CCR landfill and must meet the location standard requirements of unstable areas. The Location Restrictions Demonstration – Southeast Section 16 Landfill details how the facility has met the requirements. Foundation site soil conditions for the Southeast Section 16 landfill do not indicate that the facility is located in an unstable area susceptible to significant differential settlement. Although commercial mining occurs in the vicinity of the facility, no prior

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mining has occurred within the footprint of the facility, or adjacent to the facility, that would undermine the stability of the facility.

Design Criteria

Upstream Raise 91

Upstream Raise 91 is a lined surface impoundment comprising approximately 75 acres and is used as a combined dewatering and storage facility for CCR products. Upstream Raise 91 was lined in 1993 with a liner system consisting of an upper component of 40-mil thick HDPE geomembrane liner and the lower component consisting of a minimum of 2 feet of compacted clay. An additional 7 acres of composite liner was installed in the southeast corner of Upstream Raise 91. The composite liner system installed in 2016 consists of a GCL, overlain by a 60-mil HDPE geomembrane liner. The Hazard Potential Classification Assessment identifies that Upstream Raise 91 is considered a low hazard potential CCR surface impoundment. This is supported by evidence that the volume of water impounded is relatively small; there are no residences or occupied structures directly adjacent to the unit, discharge of water or other material is unlikely to have significant environmental impact; and economic impacts will be primarily to the owner's property. The Structural Stability Assessment for Upstream Raise 91 addresses foundation, slope protection, embankments, vegetated slopes, spillways, hydraulic structures, and downstream slopes adjacent to water bodies. The Safety Factor Assessment for Upstream Raise 91 evaluates critical cross sections of the unit under static, and seismic loading for long-term maximum storage pool loading conditions and maximum surcharge pool loading conditions. The results of the assessments have identified that the factors of safety under each applicable loading condition exceed the requirements.

Upstream Raise 92

Upstream Raise 92 is a lined surface impoundment comprising approximately 89 acres and is used as a combined dewatering and storage facility for CCR products. The west side of Upstream Raise 92 (Ash Pond 92) includes approximately 55 acres of composite liner installed in 1989. The east side of Upstream Raise 92 (Southwest Section 16) includes approximately 34 acres of composite liner installed in three phases between 2005 through 2008 over historically placed CCR/soil and the original Southwest Section 16 natural soil liner. The west side of Upstream Raise 92 was lined in 1989 with a liner system consisting of an upper component of 40-mil thick HDPE geomembrane liner and a lower component of a minimum of 2 feet of compacted clay. Approximately 34 acres on the east side of Upstream Raise 92 was lined in three phases from 2005 through 2008 with a liner system consisting of an upper component of 60-mil thick LLDPE

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geomembrane liner and a lower component of a minimum of 1 foot of compacted low hydraulic conductivity soil. The Hazard Potential Classification Assessment identifies that Upstream Raise 92 is considered a low hazard potential CCR surface impoundment. This is supported by evidence that it has been capped with CCR and graded to prevent surface water from accumulating; there are no residences or occupied structures directly adjacent to the unit; discharge of water or other material is unlikely to have significant environmental impact; and economic impacts will be primarily to the owner's property. The structural stability assessment for Upstream Raise 92 addresses foundation, slope protection, embankments, vegetated slopes, spillways, hydraulic structures, and downstream slopes adjacent to water bodies. The safety factor assessment for Upstream Raise 92 evaluates critical cross sections of the unit under static, and seismic loading for long-term maximum storage pool loading conditions and maximum surcharge pool loading conditions. The results of the assessments have identified that the factors of safety under each applicable loading condition exceed the requirements.

Drains Pond System

The Drains Pond System has approximately 17.5 acres of lined surface impoundment, of which approximately 7 acres was composite lined in 1993. The remainder of the Drains Pond System was composite lined in 2015. The east cell of the Drains Pond System was lined in 1993, and the liner system consists of an upper component of 40-mil thick HDPE geomembrane liner and a lower component of a minimum of 2 feet of compacted clay. The east cell of the Drains Pond System is not subject to the CCR requirements. The west and center cells of the Drains Pond System were composite lined in 2015. The west cell of the Drains Pond System has a bottom liner system consisting of (from bottom to top):

- 2 feet of compacted clay rich material with a hydraulic conductivity of $1x10^{-7}$ cm/sec
- 60-mil HDPE geomembrane liner
- Geocomposite drainage layer
- GCL
- 60-mil HDPE geomembrane liner
- 2 feet of protective cover

The center cell of the Drains Pond System has a bottom liner system consisting of (from bottom to top):

- 2 feet of compacted clay rich material with a hydraulic conductivity of $1x10^{-7}$ cm/sec
- 60-mil HDPE geomembrane liner

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- 2 feet of protective cover

The Hazard Potential Classification Assessment identifies that the center and west cells of the Drains Pond System is considered a low hazard potential CCR surface impoundment. This is supported by evidence that the volume of water impounded is relatively small; there are no residences or occupied structures directly adjacent to the unit, discharge of water or other material is unlikely to have significant environmental impact; and economic impacts will be primarily to the owner's property. The structural stability assessment for the Drains Pond System addresses foundation, slope protection, embankments, vegetated slopes, spillways, hydraulic structures, and downstream slopes adjacent to water bodies. The safety factor assessment for the Drains Pond System evaluates critical cross sections of the unit under static, and seismic loading for long-term maximum storage pool loading conditions and maximum surcharge pool loading conditions. The results of the assessments have identified that the factors of safety under each applicable loading condition exceed the requirements.

Operating Criteria

The 2025 Annual Fugitive Dust Control Plans for the CCR units at the facility identifies actions taken by the facility to control fugitive dust associated with collection, handling, loading, transport, and placement of CCR materials. Activities for reducing fugitive dust emissions include but are not limited to moisture conditioning, utilizing baghouses and filters, restricting haul road speeds, wetting haul roads, reducing or halting operations during high winds. Records of citizens' complaints are incorporated into the annual report, along with a summary of corrective actions taken. Corrective measures were not needed during 2025 for all CCR units at Coal Creek.

The Run-on and Run-off Control System Plans for the CCR units at the facility identify run-on controls, run-off controls, contact water run-off controls, and non-contact water run-off controls that are utilized to meet the requirements. Appropriate engineering calculations are included in the plans to identify how the facility meets the design requirements of maintaining adequate run-on/run-off controls to prevent flow onto the active portion and collect and control water volume experienced during a 24-hour, 25-year storm events.

The Inflow Design Plans for the CCR units at the facility identify the requirements for hydrologic and hydraulic capacity, inflow design flood control systems, and flood control calculations. Upstream Raise 91, Upstream Raise 92, and the Drains Pond System are classified as low hazard potential CCR surface impoundments. Annual inspections of the CCR units and the

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results of those inspections by a registered professional engineer are provided to the Department, placed in the facility's operating record, and added to the facility's publicly accessible website.

Ground Water Monitoring and Corrective Action

Groundwater monitoring for the CCR units includes 20 upgradient wells and 14 downgradient wells. Of the 14 downgradient wells, three downgradient wells are for the Drains Pond system, three downgradient wells are for Upstream Raise 91, three downgradient wells are for Upstream Raise 92, and five downgradient wells are for the Southeast Section 16 landfill.

In addition to those upgradient and downgradient wells, Rainbow will be installing a total of 9 additional wells. Of those 9 additional wells, one will be an upgradient well for the Upstream Raise 91, two will be downgradient wells for the Drains Pond System, two will be downgradient wells for Upstream Raise 91, two will be downgradient wells for Upstream Raise 92, and two will be downgradient wells for the Southeast Section 16 landfill. The additional wells will be installed by the end of the second quarter of 2027 and then a minimum of eight independent samples will need to be collected prior to beginning detection monitoring comparative statistical analysis at the wells.

Rainbow is also proposing to replace a total of 6 wells due to the distance from the unit boundaries and identification of CCR and/or CCR-impacted soils remaining from past depositional practices in the North Section 16 area at or near the wells. Of those 6 wells that will be replaced, one will be a replacement for a downgradient well for Upstream Raise 92, and five will be replacements for downgradient wells for the Southeast Section 16 landfill. The replacement wells will be installed by the end of the second quarter of 2027 and then a minimum of eight independent samples will need to be collected prior to beginning detection monitoring comparative statistical analysis at the wells. The existing wells will continue to be sampled until the replacement wells have completed the minimum of 8 independent samples.

The groundwater monitoring plan includes sampling and analysis procedures which describe sample collection, preservation, and shipment, analytical procedures, chain of custody control, and quality assurance and control procedures. Quality assurance/quality control (QA/QC) procedures include taking blind duplicate samples, field blanks, equipment blanks, and matrix spike duplicates to ensure that the sample and equipment used for sampling are accurate. Field documentation forms will be utilized by field personnel during sampling events to provide record, and observation of field activities at the time of sampling.

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The groundwater monitoring program is currently in detection monitoring. The wells associated with these units are sampled and analyzed for the required parameters listed in Appendix 1 of NDAC Chapter 33.1-20-08. In the event that the unit(s) transition into an assessment monitoring program, monitoring wells will be sampled for the parameters listed in Appendix II of NDAC Chapter 33.1-20-08.

The groundwater monitoring system was certified and stamped by a registered professional engineer. The statistical methods for analyzing sampling results for the groundwater associated with the CCR units is certified and stamped by a registered professional engineer. Intrawell statistics are utilized due to both the spatial variability and historical impacts resulting from legacy units. Statistical analysis is conducted using the Sanitas Statistical Software. Prediction limits, and Shewart-CUSUM control charts are utilized in establishing baseline statistical limits. Comparative statistical analysis is conducted following each detection monitoring events. If a verified statistically significant increase (SSI) resulted from a monitoring event, the facility will establish an assessment monitoring program meeting the requirements. Alternatively, the facility may demonstrate that a source other than the regulated CCR unit caused the SSI, or the SSI was a result of error in sampling, analysis, statistical evaluation, or natural variability in the groundwater quality, within 90 days of identifying the verified SSI. A report documenting the alternative source demonstration will be submitted to the Department for review, and approval. The results of the groundwater sampling events, and any alternative source demonstrations are provided to the Department and placed on the public website through an annual groundwater report due by March 1st of each year.

Closure

Drains Pond System

The west cell and center cell of the Drains Pond System will be closed by removal of CCR, the liner systems, and any underlying and surrounding contaminated soils. The east cell of the Drains Pond System will be closed by removal of all standing liquids, waste and waste residues, the liner system, and any underlying and surrounding contaminated soils and it is not subject to the CCR requirements. The postclosure care period will be 5 years if the units are closed by removal. Financial assurance for the closure of the Drains Pond Systems was included with the application.

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Upstream Raise 91

The Department is working closely with the United States Environmental Protection Agency (USEPA) and Rainbow to determine the final date of receipt of waste and the final closure date of Upstream Raise 91 due to the bottom liner not meeting the prescriptive liner requirements for existing CCR surface impoundments in NDAC Subdivision 33.1-20-08-04(1)(d). The final date of receipt of waste and the final closure date will be laid out in a legal agreement between the Department and Rainbow that will be handled outside of this permit review. Any changes to the final cover design including changes to the final height will be subject to the Department's rules regarding permit modifications in NDAC Subsection 33.1-20-02.1-04(7).

The total area of Upstream Raise 91 that will receive final cover is approximately 72 acres. Upstream Raise 91 will be closed incrementally as CCR placement progresses. Upstream Raise 91 operates by receiving sluiced FGD, and dry CCR until the design FGD grades are met. After FGD sluicing is completed, free water will be decanted off the surface, and a cap of dry CCR or soil will be placed over the FGD. Following placement of the dry cap, drainage of the FGD will continue through perimeter drains, sumps, and crossover culverts between the unit and the drains pond system. Once consolidation and drainage stabilize, the final cover system will be placed. Final cover soil placement, moisture conditioning, compaction, and testing will be in accordance with the 2013 Final Cover Construction Quality Assurance Plan. The final cover consists of an alternative ET final cover approved by the Department which consists of 30-inches of clay-rich, plant root zone soil, and 6-inches of topsoil capable of sustaining native plant growth. Following final cover placement, vegetation, and surface water controls will be established. Financial assurance for the closure of Upstream Raise 91 was included in the application.

Upstream Raise 92

Upstream Raise 92 is currently undergoing the final closure process; the facility has not received any waste since 2021. The total area of Upstream Raise 92 that will receive final cover is approximately 88 acres. Upstream Raise 92 was operated by receiving sluiced FGD, and dry CCR until the design FGD grades were met. After FGD sluicing was completed, free water was decanted off the surface, and a cap of dry CCR material or soil was placed over the FGD. Following placement of the dry cap, drainage of the FGD will continue through perimeter drains, sumps. Once consolidation and drainage stabilize, the final cover system will be placed. Currently consolidation, and settlement of Upstream Raise 92 is being monitored by settlement markers, and piezometers. Final cover soil placement, moisture conditioning, compaction, and testing will be in accordance with the 2013 Final

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Cover Construction Quality Assurance Plan. The final cover consists of an alternative ET final cover approved by the Department which consists of 30-inches of clay-rich, plant root zone soil, and 6-inches of topsoil capable of sustaining native plant growth. Following final cover placement, vegetation, and surface water controls will be established. Financial assurance for the closure of Upstream Raise 92 was included in the application.

Southeast 16

The total area of the Southeast Section 16 landfill that will receive final cover is approximately 61 acres. Final cover soil placement, moisture conditioning, compaction, and testing will be in accordance with the 2013 Final Cover Construction Quality Assurance Plan. The final cover consists of an alternative ET final cover approved by the Department which consists of 30-inches of clay-rich, plant root zone soil, and 6-inches of topsoil capable of sustaining native plant growth. Following final cover placement, vegetation, and surface water controls will be established. Financial assurance for the closure of the Southeast Section 16 landfill was included in the application.

Drains Pond System

The Drains Pond System will be closed by removal of all CCR material, liner system, and any underlying and or surrounding contamination.

Postclosure

Upstream Raise 91

During the 30-year post-closure period, Rainbow will implement inspection, maintenance, monitoring of the final cover integrity, maintain the groundwater monitoring system, and monitor groundwater. If Upstream Raise 91 is operating under an assessment monitoring groundwater monitoring program, Rainbow will continue to conduct post-closure care until the unit can return to a detection monitoring program. Within 60 days following completion of the post-closure care period, Rainbow will prepare a notification certified by a qualified professional engineer that post-closure care has been completed in accordance with the post-closure care plan.

The final cover system will be inspected for signs of settlement, subsidence, erosion, and other damages. Surface water controls will be inspected to verify that run-on and run-off controls are operating adequately. During the first 5 years of the post-closure period, inspections will be conducted semi-annually while vegetation is becoming established. Once healthy vegetation is established, inspections of Upstream Raise 91 will be conducted

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annually. Maintenance activities of the final cover system include placing earthen fill to correct the effects of settlement, subsidence, erosion, and to prevent run-on and run-off from damaging the final cover system. Areas requiring repairs will be reseeded to limit erosion and promote transpiration. Leachate will be removed from the unit by the sump and will be routed to the drains pond system.

Upstream Raise 92

FGD sluicing in Upstream Raise 92 was completed in 2020, with final placement of dry CCR material in April 2021. Notification of intent to close the unit was reported to the Department and placed in the facility's operating record. Closure activities are required to be completed within 5 years of commencing closure, or as allowed through a closure extension demonstration. A two-year extension of the closure of Upstream Raise 92 has been requested. The extension has been requested due to the time it is taking for the FGD to consolidate and settle, as significant settlement has been noted since closure was implemented.

During the 30-year post-closure period, Rainbow will implement inspection, maintenance, monitoring of the final cover integrity, maintain the groundwater monitoring system, and monitor groundwater. If Upstream Raise 92 is operating under an assessment monitoring groundwater monitoring program, Rainbow will continue to conduct post-closure care until the unit can return to a detection monitoring program. Within 60 days following completion of the post-closure care period, Rainbow will prepare a notification certified by a qualified professional engineer that post-closure care has been completed in accordance with the post-closure care plan.

The final cover system will be inspected for signs of settlement, subsidence, erosion, and other damages. Surface water controls will be inspected to verify that run-on and run-off controls are operating adequately. During the first 5 years of the post-closure period, inspections will be conducted semi-annually while vegetation is becoming established. Once healthy vegetation is established, inspections of Upstream Raise 92 will be conducted annually. Maintenance activities of the final cover system include placing earthen fill to correct the effects of settlement, subsidence, erosion, and to prevent run-on and run-off from damaging the final cover system. Areas requiring repairs will be reseeded to limit erosion and promote transpiration. Leachate will be removed from the unit by the sump and will be routed to the Drains Pond System.

Southeast Section 16 Landfill

During the 30-year post-closure period, Rainbow will implement inspection, maintenance, monitoring of the final cover integrity,

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maintain the groundwater monitoring system, and monitor groundwater. If the Southeast Section 16 landfill is operating under an assessment monitoring groundwater monitoring program, Rainbow will continue to conduct post-closure care until the unit can return to a detection monitoring program. Within 60 days following completion of the post-closure care period, Rainbow will prepare a notification certified by a qualified professional engineer that post-closure care has been completed in accordance with the post-closure care plan.

The final cover system will be inspected for signs of settlement, subsidence, erosion, and other damages. Surface water controls will be inspected to verify that run-on and run-off controls are operating adequately. During the first 5 years of the post-closure period, inspections will be conducted semi-annually while vegetation is becoming established. Once healthy vegetation is established, inspections of the Southeast Section 16 landfill will be conducted annually. Maintenance activities of the final cover system include placing earthen fill to correct the effects of settlement, subsidence, erosion, and to prevent run-on and run-off from damaging the final cover system. Areas requiring repairs will be reseeded to limit erosion and promote transpiration. Leachate within the landfill will flow to the contact water collection area during the post-closure period. Any leachate removed will be conveyed to the Drains Pond System. Once the Southeast Section 16 contact water collection area is no longer needed, it will be closed by removal.

Recordkeeping, Notification, and Posting of Information to the Internet

Rainbow maintains a publicly accessible website that maintains the required documents, plans, assessments demonstrations, certifications and reports. The operating record is maintained in Rainbow's electronic workspace and is accessible to Rainbow employees. The system automatically initiates work orders for scheduled inspections and maintenance. Information from the operating record will be furnished upon request at all reasonable times to the Department.

A recordkeeping inspection was conducted as part of this review, and Rainbow provided each of the requested documents as required and showed that the operating record is complete. The items maintained on the website include documents relating to Location Standards, Design Criteria, Operating Criteria, Groundwater Monitoring and Corrective Action, and Closure and Postclosure Care.

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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 application includes a plan of operations for the 4 CCR units. The plan of operation addresses site development, waste acceptance and deposition, monitoring and inspections, contingencies and extreme events, safety and training procedures, recordkeeping requirements, and other items. Additional information can be found in the **Operations** section of this memo.

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 maintained in Rainbow's electronic workspace and is accessible to Rainbow employees. The system automatically initiates work orders for scheduled inspections and maintenance. Information from the operating record will be furnished upon request at all reasonable times to the Department.

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

The requirements of this section are not applicable as the facility is a CCR facility and is required to follow the groundwater monitoring requirements in NDAC Section 33.1-20-08-06. Information regarding groundwater monitoring can be found in **12. CCR unit, chapter 33.1-20-08** section of this memo.

k. Construction quality assurance and quality control;

The facility has two construction quality assurance plans dated 2008 and 2013 that detail the construction quality assurance and quality control for the construction of the upstream raise units and the final cover construction. The plans were included with the application. These plans include documentation and record keeping requirements, material evaluation and testing requirements, progress meetings, and other construction items. These apply to both the CCR units and non-CCR units.

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In addition, Upstream Raise 91, Upstream Raise 92, and the Drains Pond System surface impoundments, are required to have documentation and certifications for their liners. The reports are required to be certified and stamped by a registered professional engineer. These units are also required to have structural stability, and safety factor assessments conducted. The reports are required to be certified and stamped by a registered professional engineer.

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

The facility has closure plans for each of its units. Additional information regarding the closure plans can be found in the **Closure** section and **12. CCR unit, chapter 33.1-20-08** sections of review memo.

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

The facility has closure plans for each of its units. Additional information regarding the closure plans can be found in the **Closure** section and **12. CCR unit, chapter 33.1-20-08** sections of review memo.

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.

Conclusion

Based on the submitted application and items discussed above, Rainbow Energy Center has shown that the renewal meets the requirements of the North Dakota Solid Waste Management Rules. It is proposed that the Department grant Rainbow Energy Center a permit with the conditions listed in Permit 0033. The proposed permit length is for a period of 10 years.

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