INTRADEPARTMENTAL MEMORANDUM

FILE: DGC (0169)

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

THROUGH: Diana A. Trussell, Manager
Solid Waste Program
Division of Waste Management

FROM: Kirk D. Johnson, Env. Scientist
Solid Waste Program
Division of Waste Management

SUBJECT: Permit Application Review

DATE: June 6, 2022

Introduction

On September 15, 2021, the North Dakota Department of Environmental Quality (Department) received a permit application for a renewal for Dakota Gasification Company’s (DGC) surface impoundments.

DGC owns and operates a surface impoundments facility, regulated under Permit 0169 on approximately 34 acres located in Section 19, Township 146 North, Range 87 West in Mercer County, ND. The facility is proposing to renew their permit to continue operating the five surface impoundments (ponds). The facility was first permitted in April 1995.

Design

Deepwell Feed Surge Pond (DWSP)

The DWSP is an 11.5 million-gallon (with a 2-foot freeboard) capacity pond that covers 5.2 acres. In 2002, the pond was rebuilt to conform to the current Solid Waste Management Rules, with the installation of dual high-density polyethylene (HDPE) liners enveloping a leachate collection and drain system. The leachate collection system consists of a geonet between two synthetic liners sloped to a six-inch HDPE pipe drain system. The drain system discharges to a sump where the leachate is automatically pumped back into the pond.

Liquid Waste Incinerator (LWI) Feed Surge Pond

The LWI Feed Surface Pond was reconstructed in 1992 to the current Solid Waste Management Rules and is a lined 1.8-million-gallon pond with 18-inch freeboard capacity and covers 1.3
acres. It lies just east of the DWSP and consists of a three-foot compacted clay liner overlain by dual HDPE liners, enveloping a geonet leachate collection and drain system. The drain system discharges into a sump where the leachate is automatically pumped back into the pond.

Multiple Effect Evaporator (MEE) Feed Surge Pond

The MEE Feed Surge Pond was reconstructed in 1992 according to the current Solid Waste Management Rules and is a 3.7-million-gallon capacity pond with a 2-foot freeboard and covers 2.6 acres. Like the LWI Feed Surge Pond, it contains a three-foot compacted clay liner, dual HDPE synthetic liners enveloping a leachate collection and drainage system. In August 2008, repairs and upgrades to the pond began and were completed on the primary liner in August 2012.

Cooling Tower Surge Pond A (CTSP-A)

The CTSP-A was reconstructed to the current Solid Waste Management Rules in 1994 and is the largest surge pond within the gasification facility. As with the other ponds, it contains a three-foot compacted clay liner, dual synthetic liners enveloping an inner geonet leachate collection and drainage system. The CTSP-A has a total capacity of 45.7 million gallons, with a 40-inch freeboard, and covers 13.5 acres.

In 2006, the CTSP-A pond sustained extensive liner damage with numerous tears and holes that were leaking liquids, due to removal of sediments. Approximately 60,000 square feet of 60-mil HDPE liner was replaced. All repairs were completed by October 2006 and met the leakage criteria established in the permit.

Cooling Tower Surge Pond B (CTSP-B)

CTSP-B was also reconstructed to the current Solid Waste Management Rules in 1994. The CTSP-B has a storage capacity of 42.8 million gallons with a 40-inch freeboard and covers 11.5 acres. The 1994 reconstruction included increasing the size and raising the subgrade elevation approximately eight feet. The CTSP-B was also reconstructed with a three-foot compacted clay liner and a 60-mil HDPE primary liner but has no leachate drainage system.

Operation

Deepwell Feed Surge Pond (DWSP)

The two main plant discharges into this pond include inorganic brine (salt water), from the gasification secondary water treatment area, and low-pressure boiler blowdown liquids. The DWSP is designed to store excess brine water for ongoing pumping into two deep injection wells, which inject/dispose of waste brine water into the Minnelusa and Kibbey underground formations about 6,500 feet below the surface.

Liquid Waste Incinerator (LWI) Feed Surge Pond

The LWI Feed Surge Pond is designed to store excess 'multiple effect evaporator' (MEE) concentrate from the multiple effect evaporators. The MEE concentrate is recycled back to the synfuel plant gasifiers for reuse.
Multiple Effect Evaporator (MEE) Feed Surge Pond

The MEE Feed Surge Pond is designed to provide surge capacity for the cooling tower blowdown liquids, which are then fed to the MEE Feed Surge Pond. Blowdown liquids streams are purged from the synfuels plant cooling tower to maintain stable dissolved solids concentrations in the cooling tower. Two streams of plant liquids are then generated, creating both a MEE concentrate liquid and a distillate liquid. The MEE concentrate either goes directly to the plant gasifiers or sent to the LWI Feed Surge Pond for storage. The distillate is recycled into cooling and utility water and redistributed throughout the plant.

Cooling Tower Surge Pond A (CTSP-A)

The CTSP-A is designed to store cooling water during periods of low evaporation. Cooling water sources include 'gas liquor' from the gasification process that is treated to remove phenols and ammonia. Additional cooling sources include MEE distillate liquids and 'dissolved air flotation' effluent (DAF) from the oily water sewer. The CTSP-A is slowly drained of cooling water during the hotter months, and empty by September. Between September and April of each incoming year, excess plant cooling water is channeled back into the CTSP-A, refilling it.

Cooling Tower Surge Pond B (CTSP-B)

The CTSP-B was built for emergency storage of facility cooling water and was used for the first time in February 2005. Excess cooling water is transferred into and out of the pond from the CTSP-A via a six-inch HDPE pipeline and diesel pump.

Closure

Upon closure of the facility, the five surface impoundments will be reclaimed with no waste material disposed in place. Each of the impoundments will be closed by removing the HDPE liners, leachate collection system and any impacted clay liner material. Each impoundment will be filled with clean subsoil, covered with one foot of topsoil, and reseeded. All waste materials will be disposed in a permitted landfill.

Compliance History

The following items of noncompliance have been noted since 2018:

1. A Department letter of apparent noncompliance (LOAN) inspection letter, dated June 18, 2018, noted that the CTSP-B impoundment was very close to its freeboard limits. In addition, some erosional rilling had been observed on the west side of CTSP-A impoundment.

2. On April 9, 2020, the Department sent a letter to DGC stating that the financial assurance nomenclature that DGC filed with the Department on March 27, 2020 was incorrect. The wording of the financial test was not identical to the wording in NDAC subsection 6 of section 33.1-24-05-81.

3. On December 30, 2020, the Department sent DGC a LOAN letter detailing several deficiencies in the facility's 2018 and 2019 Annual and Groundwater Reports. Discrepancies included a failure to change the official Department nomenclature from the NDDoH to the NDDEQ; exceedences for several parameters sampled; a lack of
references to Volatile Organic Compounds (VOCs) levels in the reports; several missing monitoring well locations and failure to discuss MCL exceedances of certain parameters and statistically significant increases (SSIs) in the document summaries.

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 is not required for surface impoundments that will be clean closed.

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

The landfill property and surrounding access areas of the landfill are owned by Dakota Gasification Company. They have the right to the use of the property for which a permit is sought, including all access routes. After facility final closure, DGG will maintain the right of access to the site throughout the postclosure period.

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

A preapplication was completed and approved by the Department in December 1994.

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

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

DGG submitted one print copy and one searchable electronic copy of the application and supporting documents along with the $3,000 permit application processing fee. The application was prepared and signed by the applicant.

**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:

1. A completed application form, subsection 1;

   On September 15, 2021, DGG submitted one print copy and one searchable electronic copy of the application and supporting documents. The application
was prepared and signed by the applicant. The permit application processing fee of $3,000 was received on September 27, 2021.

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;

**Deepwell Feed Surge Pond (DWSP)**

The two main plant discharges into this pond include inorganic brine (salt water), from the gasification secondary water treatment area, and low-pressure boiler blowdown liquids. The DWSP is designed to store excess brine water for ongoing pumping into two deep injection wells, which inject/dispose of waste brine water into the Minnelusa and Kibbey underground formations about 6,500 feet below the surface.

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**Cooling Tower Surge Pond B (CTSP-B)**

The CTSP-B was built for emergency storage of facility cooling water and was used for the first time in February 2005. Excess cooling water is
transferred into and out of the pond from the CTSP-A via a six-inch HDPE pipeline and diesel pump. DGC impoundments do not receive any solid or liquid wastes from facilities outside of North Dakota, per Section 23.1-08-14, Waste characterization.

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;

In 1990, a complete "Hydrogeologic Investigation and Detailed Site Design Report" was prepared by Donohue, the contracted consultant agency. The investigation detailed that the location for the proposed facility was suitable for landfill construction and disposal activities and fulfilled the general location standards outlined in NDAC Section 33.1-20-04.1-01. The site is overlain by the Sentinel Butte Formation, and contains interbedded lignite seams, some of which contained recoverable amounts of lignite. One of these seams is the "Beulah Trench," or "Beulah Bed," which is the uppermost groundwater saturated unit below the landfill liner, which is primarily a lignite seam with porous post-glacial sediments overlying it.

Underneath the Beulah Bed no lignite seams were mined, and underlying the Beulah Bed there is a 35-60-foot-thick layer of clay, claystone and shale that limits any possibility of vertical leachate seepage to the deeper Spaer (lignite seam) Aquifer.

The shallow groundwater flow in the Beulah Bed lies about 80-95 feet below the ground surface (bgs), and flows from the northwest to south, while the undisturbed Spaer Aquifer is situated about 115-155 bgs, and groundwater flow is from the southeast to north/northeast. Groundwater flows from the water table to Antelope Creek Aquifer, portions of which lie directly below the DGC facility and flows along a south/southeasterly route joining the Knife River aquifer near Hazen. This aquifer is about 18 miles long, less than one mile wide, and in places up to 250 feet thick, with an average hydraulic conductivity of 3.5 x 10^{-3} cm/sec. The Antelope Creek Aquifer in turn feeds water into the Spaer Aquifer and possibly even lower lignite seams.

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

A detailed soil survey and segregation of suitable plant growth material was completed and included within the 1990 Donohue report. The report shows that there is sufficient quantities of soils for the reclamation of the ponds as they will be clean closed with no waste left in place.

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

All DGC personnel receive instruction in solid waste handling and permit requirements, which includes the dates of training, facility plans, description of instruction methods and certificates that are placed in the facility's operating record. In addition, DGC complies with the rules concerning the reduction of facility odors; controlling fugitive dust; a permanent facility sign
with required data; employee facility inspections and collections of windblown ash and trash for temporary storage containment and landfill disposal.

DGC's surface impoundments facility is designed to divert all outside stormwater from entering the site, and to contain all ash water runoff within the facility. All ash water runoff contained in the facility is recycled in the DGC plant liquids handling system. All stormwater which does not come into contact with ash is stored in several stormwater ponds and is either discharged as needed under the Department's – Division of Water Quality Permit NDR05-0736 or is recycled into the DGC cooling water system.

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.

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.

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

The requirements of this section are not applicable as the facility is not proposing any disposal activities.

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;

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

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 Plan of Operation includes a Surface Impoundment Contingency Plan that was included with the permit renewal application. It includes:

- Hazards such as leakage or containment failure of the surge ponds
• Consequences of leakage including soil and surface/subsurface water contamination and harm to wildlife and their habitats.

• Emergency notification to responsible DGC supervisors, emergency clean-up contractors, and required state and federal agencies, including the Department, the Department of Emergency Services and the National Response Center.

• Resources including a list of DGC equipment available for emergency response, as detailed in DGC's Plant Emergency Plan 4310. These include loaders, excavators, vacuum and dump trucks and portable pumps.

• Goals and objectives include stopping or redirecting impoundment leakage and prevent offsite migration of pollutants southeast towards the Antelope Creek drainage by confining/containing the liquids, including blocking the plant's southeast peripheral stormwater ditch as needed. Then collect the released liquids and remediate the impacted area. Pooled liquids are then collected with vacuum equipment and downstream water samples of Antelope Creek taken as needed with one sample taken every 12 hours in each quarter mile up to one mile from the ponds. An analysis of creek samples for constituents of concern would include at a minimum phenols, ammonia, salinity, pH and sulfates, and any others the Department may require.

In addition, the Plan of Operation covers recordkeeping. DGC maintains an operating record that includes:

• A copy of each permit application
• Site characterization
• Documentation of training
• Plan of Operation
• Preapplication documents and plans
• Reports and facility inspection logs
• Record of notices
• As-built drawings
• Financial assurance documents
• Annual reports
• Groundwater monitoring plan and data
• Closure/post-closure plans
• Fugitive dust and odor control plans

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 on file at the facility in the Environmental Department.
j. Demonstration of capability to fulfill the groundwater monitoring, sections 33.1-20-08-06 or 33.1-20-13-02;

Groundwater flow is from the west/northwest to east across the site relative to the Beulah Trench. The water table occurs at approximately 15-40 feet below surface grade (bsg). There are sixteen groundwater (GW) monitoring wells surrounding the five impoundments. All of these wells are shallow, water table wells with the exception of W02009 which is a piezometer forming a nest with MW 2001.

There are three upgradient monitoring wells: W02005 that lies north of the LWI Surge Pond; W02017 and W02018 that lie just west of the Deepwell Surge Pond. The 13 remaining monitoring wells are either downgradient or sidegradient to the ponds and are positioned such that any release should be noted before it reaches the plant boundary.

k. Construction quality assurance and quality control;

Past construction projects have followed the Department's Guideline 5 for construction. The facility has submitted construction documentation reports for each of the surface impoundments and received approval from the Department for the construction.

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

Closure and post-closure plans were included in the permit application within the section summary under Financial Assurance. Upon closure of the facility, the five surface impoundments will be reclaimed with no waste material disposed in place. Each of the impoundments will be closed by removing the HDPE liners, leachate collection system and any impacted clay liner material. Each impoundment will be filled with clean subsoil, covered with one foot of topsoil, and reseeded. All waste materials will be disposed in a permitted landfill.

The facility has $2,243,000 for financial assurance for closure costs.

m. Demonstrations of capability to fulfill the postclosure standards, section 33.1-20-04.1-09 and otherwise provided by this article; and subsection 33.1-20-04.1-09(4).

In the permit application, it states that there is no need for post-closure groundwater monitoring as no waste material will be disposed in place. With the clean closure of the surface impoundments, a shorter post-closure care period of 5 years will be required to monitor the vegetation to ensure it gets established. It is recommended that a permit condition be added to the permit requiring a postclosure plan be submitted prior to the closure of the surface impoundments.
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 September 15, 2021.

Site Specific Conditions

It is recommended that the following conditions from the current Permit 0169 be included in the permit (they have been renumbered in accordance with the permit):

**G.1.** All surface impoundments shall be inspected at least once per week from March 1 through December 1, at least monthly at other times, and after significant precipitation or runoff events, when water inflows are expected to be elevated and/or in other cases when concerns on pond levels, integrity or other issues may arise. An approved inspection checklist that addresses appropriate elements and parameters for waste impoundments shall be used for routine inspections and at least one (1) completed inspection checklist shall be filed in the facility's Operating Record for each calendar month. (NDAC Subsection 33.1-20-08.1(3)(a))

**G.2.** Sixty (60) days prior to removal, the Permittee shall notify the Department of any pond that is cleaned/dredged for solids removal. All material removed will be sampled before being placed in any permanent location. The Department will give final approval on final disposal. (NDAC Subsection 33.1-20-08.1-02)

**G.3.** Should the levels of any ponds be within their stated limit of freeboard, or less, the Permittee shall inform the Department of the situation, provide a plan for management of pond waters to manage any excess, should it occur, and provide a plan to minimize, control, restore and/or maintain capacity. When such conditions arise, the Permittee shall initiate a monthly report to the Department on the ponds' status and what measures are being done to control and reduce the pond levels.

It is recommended that the following condition be added based on the permit application review:

**G.4.** Prior to the closure of any of the surface impoundments, the Permittee shall submit a postclosure plan to the Department for review and approval. Upon approval, the Permittee shall conduct postclosure in accordance with the approved plan.

**Conclusion**

Based on the submitted application and items discussed above, Dakota Gasification Company has shown that the renewal meets the requirements of the North Dakota Solid Waste Management Rules. It is proposed that the Department grant Dakota Gasification Company a permit with the conditions listed in Permit 0169. The proposed permit length is for a period of 10 years because the facility has not had any major compliance issues since the previous renewal.

CRH:DAT:KDJ
Attachment