Statement of Basis

Minor Air Quality Operating Permit and Air Quality Construction Permit Modification

Brookings Biogas LLC – Hammink Dairy
Bruce, South Dakota

South Dakota Department of Agriculture and Natural Resources

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1.0 Background

On December 20, 2022, the Department of Agriculture and Natural Resources (DANR) issued an air quality construction permit to Brookings Biogas LLC (Brookings Biogas), for a renewable natural gas facility at Hammink Dairy near Bruce, South Dakota.

Brookings Biogas' locations consist of three individual anerobic digester plants and one central gas upgrader and pipeline injection point site. The anerobic digesters are located at three dairies: Global, Hammink, and Northern Sky. DANR will discuss only the digester at Hammink Dairy for this permit review.

At Hammink Dairy, manure is collected in a reception pit and is fed into a continuously stirred tank reactor digester. The required heat is supplied by a gas fired boiler system. The biogas produced in the digester is sent through a hydrogen sulfide removal system before being directly piped to the central upgrading and injection site. In case of operational issues, a flare will be used to control untreated biogas.

1.1 Existing Equipment

Table 1-1 provides a list of the units presently permitted which was taken from the air quality construction permit #28.000150-01C as issued on December 20, 2022.

Table 1-1 – Description of Permitted Units, Operations, and Processes

Unit	Description	Maximum Operating Rate	Control Device
#1	Hammink Flare	15 million Btu per hour	Not applicable

Table 1-2 provides a description of other units that were reviewed during the issuance of the air quality construction permit but were determined to be insignificant activities.

Table 1-2 – Description of Other Units, Operations, and Processes

Description	Maximum Operating Rate	Control Device
Anerobic digester	380.8 standard cubic feet per minute	Not applicable
Biogas upgrading unit	380.8 standard cubic feet per minute	Not applicable
Hammink Boiler: 2022 or newer, fueled with natural gas and propane	3.0 million Btu per hour	Not applicable

1.2 Proposed Changes

On December 1, 2025, Brookings Biogas submitted an application for a minor air quality operating permit. DANR has changed its compliance demonstration requirements for biogas facilities; therefore, these requirements will be updated in this review. In order to permit some of these changes, the air quality construction permit #28.000150-01C will need to be modified. DANR will do the review for the minor air quality operating permit and the modified air quality construction permit at the same time for administrative ease.

2.0 New Source Performance Standards

DANR reviewed the New Source Performance Standards in 40 CFR Part 60 and determined the following may be applicable.

2.1 Standards Applicable to Boilers – Subparts D, Da, Db, and Dc

There are four New Source Performance Standards for fossil fuel-fired steam generators. The four standards are applicable to the following steam generators:

1. **40 CFR Part 60, Subpart D:** applicable to a steam generator with a maximum operating rate of 250 million Btu per hour or more and commenced construction after August 17, 1971;

2. **40 CFR Part 60, Subpart Da:** Standards for Electric Utility Steam Generating Units. This subpart is applicable to each utility generating unit that is capable of combusting more than 73 megawatts (250 million Btu per hour) heat input of fossil fuel (either alone or in combination with any other fuel) that commenced construction, modification, or reconstruction after September 18, 1978;

3. **40 CFR Part 60, Subpart Db**: applicable to a steam generator with a maximum operating rate of 100 million Btu per hour or more and commenced construction after June 19, 1984; and

4. **40 CFR Part 60, Subpart Dc**: applicable to a steam generator with a minimum design heat input capacity equal to or greater than 10 million Btu per hour but less than or equal to 100 million Btu per hour and commenced construction after June 9, 1989.

The maximum heat input rate of the boiler is less than 10 million Btu per hour; therefore, the boiler is not applicable to Subparts D, Da, Db, or Dc.

2.2 Standards Applicable to Onshore Natural Gas Plants – Subpart KKK

The provisions of 40 CFR Part 60 Subpart KKK apply to affected facilities in onshore natural gas processing plants for which construction, reconstruction, or modification commenced after January 20, 1984, and on or before August 23, 2011. A natural gas processing plant (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both.

Brookings Biogas' facility does not meet the definition of a natural gas processing plant under this subpart and construction of the facility commenced after August 23, 2011. Therefore, this subpart is not applicable to Brookings Biogas.

2.3 Standards Applicable to Onshore Natural Gas Plants – Subpart LLL

The provisions of 40 CFR Part 60 Subpart LLL are applicable to the following affected facilities that process natural gas: each sweetening unit, and each sweetening unit followed by a sulfur recovery unit which commences construction or modification after January 20, 1984, and on or before August 23, 2011.

The provisions of this subpart are not applicable to Brookings Biogas because construction of the facility commenced after August 23, 2011.

2.4 Standards for Crude Oil and Natural Gas Facilities – Subpart OOOO

The provisions of 40 CFR Part 60 Subpart OOOOa establish emission standards and compliance schedules for the control of volatile organic compound (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, reconstruction, or modification after August 23, 2011, and on or before September 18, 2015.

The provisions of this subpart are not applicable to Brookings Biogas because construction of the facility commenced after September 18, 2015.

2.5 Standards for Crude Oil and Natural Gas Facilities – Subpart OOOOb

The provisions of 40 CFR Part 60 Subpart OOOOb establish emission standards and compliance schedules for the control of greenhouse gas emissions from affected facilities that commence construction, reconstruction, or modification after December 6, 2022. An applicable facility is an onshore facility that is located within the Crude Oil and Natural Gas Production source category as defined in section 60.5430b. The definition given for a Natural Gas Production source category is "Natural gas production and processing, which includes the well and extends to, but does not include, the local distribution company custody transfer station."

The operations for the facility do not include a natural gas well. The provisions of this subpart are not applicable to Brookings Biogas because the operations at the facility do not meet the definition of a Natural Gas Production source category.

2.6 Emission Guidelines for Crude Oil and Natural Gas Facilities – Subpart OOOOc

The provisions of 40 CFR Part 60 Subpart OOOOc establish emission guidelines and compliance schedules for the control of greenhouse gas emissions from affected facilities that commence construction, reconstruction, or modification on or before December 6, 2022.

An applicable facility is an onshore facility that is located within the Crude Oil and Natural Gas Production source category as defined in section 60.5430c. The definition given for a Natural Gas Production source category is "Natural gas production and processing, which includes the well and extends to, but does not include, the local distribution company custody transfer station."

The operations for the facility do not include a natural gas well. The provisions of this subpart are not applicable to Brookings Biogas because the operations at the facility do not meet the definition of a Natural Gas Production source category.

2.7 Other Applicable New Source Performance Standards

DANR reviewed the other New Source Performance Standards and determined there are no other standards applicable to Brookings Biogas' facility at this time.

3.0 New Source Review

The Administrative Rules of South Dakota (ARSD) 74:36:10:01 state that New Source Review regulations apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. Brookings Biogas's digester facility is located near Bruce, South Dakota, which is in attainment or unclassifiable for all the pollutants regulated under the Clean Air Act. Therefore, Brookings Biogas is not subject to a New Source Review.

4.0 Prevention of Significant Deterioration

A Prevention of Significant Deterioration review applies to new major stationary sources and major modifications to existing major stationary sources in areas designated as attainment under Section 107 of the Clean Air Act for any regulated air pollutant. The following is a list of regulated air pollutants under the Prevention of Significant Deterioration program:

1. Total suspended particulate (PM);
2. Particulate with a diameter less than or equal to 10 microns (PM10);
3. Particulate with a diameter less than or equal to 2.5 microns (PM2.5);
4. Sulfur dioxide (SO_2);
5. Nitrogen oxides (NO_x);
6. Carbon monoxide (CO);
7. Ozone – measured as volatile organic compounds (VOCs);
8. Lead;
9. Fluorides;
10. Sulfuric acid mist;
11. Hydrogen sulfide;
12. Reduced sulfur compounds;
13. Total reduced sulfur; and
14. Greenhouse gases (carbon dioxide, methane, nitrous oxide, etc.).

If the source is considered one of the 28 named Prevention of Significant Deterioration source categories listed in Section 169 of the federal Clean Air Act, the major source threshold is 100 tons per year of any regulated air pollutant, except for greenhouse gases. The major source threshold for all other sources is 250 tons per year of any regulated air pollutant, except for

greenhouse gases. Brookings Biogas is not one of the 28 named Prevention of Significant Deterioration source categories; therefore, the major source threshold for pollutants is 250 tons per year. A facility must trigger one of the major source thresholds for another regulated pollutant before greenhouse gas emissions can be considered under the Prevention of Significant Deterioration permitting program. This applies to both new Prevention of Significant Deterioration program sources as well as major source modifications.

4.1 Potential Emissions

DANR uses stack test results to determine air emissions whenever stack test data are available from the source or a similar source. When stack test results are not available, DANR relies on manufacturing data, material balance, EPA's Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1), information submitted in the application, or other methods to determine potential air emissions. Potential emissions for each applicable pollutant are calculated by assuming the unit operates every day of the year at the maximum design capacity (8,760 hours per year).

4.1.1 Potential Emissions – Anaerobic Digester

The facility includes the operation of an anaerobic digester. The estimated maximum biogas generation rate is approximately 380.8 standard cubic feet per minute. Based on the current available information, the digesters do not produce particulate matter, sulfur dioxide, nitrogen oxide, volatile organic compounds, and carbon monoxide. Therefore, these emissions will not be evaluated for the digesters. The digesters do produce methane, which is a greenhouse gas. At this point, DANR will not evaluate greenhouse gases unless a Prevention of Significant Deterioration review for another pollutant is triggered first. The digesters do produce hydrogen sulfide, which could trigger a Prevention of Significant Deterioration review. Brookings Biogas is currently limited to a hydrogen sulfide content limit of 4,500 parts per million prior to flaring. Similar digester facilities operating in South Dakota typically indicate that the worst-case scenario sulfur content of the biogas produced by the digesters would be 6,500 parts per million. DANR will review the potential emissions under the worst-case scenario. Equation 4.1 was used to determine the potential hydrogen sulfide emissions from the digesters without any controls (e.g., flares).

Equation 4.1 – Digester Hydrogen Sulfide Emissions

$$Potential\ Emissions\left(\frac{tons}{year}\right) = \frac{GFlow\ x\ 60\ x\ 8{,}760\ x\ F_{H_2S} \times CF_{AP42}}{2{,}000}$$

Where:

- GFlow = biogas generation rate in cubic feet per minute (e.g., 380.8 ft^3/min)
- 60 = minutes per hour
- 8,760 = hours per year
- F_{H2S} = the hydrogen sulfide content of the fuel (i.e., 6,500 parts per million or 0.0065);
- CF_{AP42} = AP-42 conversion factor (parts per million to pounds per million cubic feet);

= 34.08 pounds per pound-mole (molecular weight of H_2S) ÷ 385.1 million cubic feet per pound-mole (derived from ideal gas law at standard temperature and pressure) or 0.0885 pounds H_2S per cubic feet H_2S;

- 2,000 = pounds per ton.

Table 4-1 lists the potential regulated emissions from the digesters without controls.

Table 4-1 – Potential Emissions from Digesters (tons per year)

Description	H_2S
Digesters	57.57

4.1.2 Potential Emissions – Biogas System

The biogas system cleans and removes containments from the biogas. A flare is connected to the system to flare off biogas and off-spec renewable natural gas. Potential emissions for the flare will be based under the operating scenario where the biogas upgrading unit is not operational and that flare burns all the biogas produced by the digester (380.8 standard cubic feet per minute).

AP-42 does not have emission factors for combusting digester gas. Emissions from the open flare for particulate matter, nitrogen oxides, carbon monoxide, and volatile organic compounds are based on emission factors in AP-42, Chapter 2.4 – Municipal Solid Waste Landfills, Table 2.4-5, August 2024. The emission factors are shown in Table 4-2.

Table 4-2 – Emission Factors for Flares

	TSP	PM_{10}	$PM_{2.5}$	NOx	CO	VOC
AP-42 (lb/MMdscf of Methane)	17	17	17	38	58	4.1

Sulfur dioxide emissions from biogas combustion depend on the sulfur content of the fuel. Most digester facilities are assumed to have a worst-case scenario sulfur content of 6,500 parts per million. However, Brookings Biogas is currently permitted to a maximum sulfur content of 4,500 parts per million.

DANR used Equation 4.2 and the estimated sulfur content to develop a sulfur dioxide emission factor based on the application of the ideal gas law under standard conditions and the assumption that any sulfur in the biogas is in the form of hydrogen sulfide and that 100 percent of that sulfur converts to sulfur dioxide during combustion. The emission factor is shown in Table 4-3.

Equation 4.2 – Sulfur Dioxide Emission Factor Derivation for Flares

$$Emission\ Factor\left(\frac{lb\ SO_2}{MMscf}\right) = \frac{F_{H_2S} \times CF_{AP42} \times WF_{S/H_2S}}{WF_{S/SO_2}}$$

Where:

- F_{H2S} = the hydrogen sulfide content of the fuel (i.e., 6,500 or 4,500 parts per million);
- CF_{AP42} = AP-42 conversion factor (parts per million to pounds per million cubic feet);

= 34.08 pounds per pound-mole (molecular weight of H_2S) ÷ 385.1 million cubic feet per pound-mole (derived from ideal gas law at standard temperature and pressure);
= 0.088 pounds per million cubic feet, per parts per million

- $WF_{S/H2S}$ = weight fraction of sulfur in hydrogen sulfide (i.e., 0.94 pounds of sulfur per pounds of hydrogen sulfide);
- $WF_{S/SO2}$ = weight fraction of sulfur in sulfur dioxide (i.e., 0.50 pounds of sulfur per pounds of sulfur dioxide);

Table 4-3 – Sulfur Dioxide Emission Factor

	ppm	SO_2
Pounds per million standard cubic feet	6,500	1,075.36
Pounds per million standard cubic feet	4,500	744.48

Potential emissions from the flare are calculated using Equation 4.3, the maximum operating rate of the flare (22,848 standard cubic feet per hour), the emission factors found in Tables 4-2 and 4-3, and 8,760 hours. The results are shown in Table 4-4.

Equation 4.3 – Potential Flare Emissions Calculation

$$Potential\ Emissions\left(\frac{tons}{year}\right) = \frac{Capacity\left(\frac{scf}{hour}\right) \times Emission\ Factor\left(\frac{pounds}{MMscf}\right) \times 8{,}760\left(\frac{hours}{year}\right)}{1{,}000{,}000\ \left(\frac{scf}{MMscf}\right) \times\ 2{,}000\left(\frac{pounds}{ton}\right)}$$

Table 4-4 – Potential Emissions from Flare (tons per year)

Unit	TSP	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOC
Flare	1.70	1.70	1.70	107.62	3.80	5.80	0.41

4.1.3 Potential Emissions – Boiler

Brookings Biogas operates a natural gas and propane-fired boiler. The emission factors for natural gas combustion are derived from AP-42, 1.4, Tables 1.4-1 and 1.4-2, July 1998, and are displayed in Table 4-5.

Table 4-5 – Emission Factors Natural Gas Combustion

	TSP	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	VOC
Pounds per million cubic feet[1]	7.6	7.6	7.6	0.6	100	84	5.5
Pounds per million Btu	0.0075	0.0075	0.0075	0.0006	0.098	0.082	0.0054

[1] – To convert from pounds per million gallons to pounds per million Btu, divide by 1,020.

The emission factors for propane combustion are derived from AP-42, 1.5, Table 1.5-1, July 2008, and are displayed in Table 4-6.

Table 4-6 – Emission Factors Propane Combustion

	TSP	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	VOC
Pounds per 1,000 gallons[1]	0.7	0.7	0.7	0.10S[2]	13	7.5	0.8
Pounds per million Btu	0.0077	0.0077	0.0077	0.0002	0.14	0.082	0.0087

[1] – To convert from pounds per million gallons to pounds per million Btu, divide by 91.5; and

[2] – S is the sulfur content of propane in grains per 100 cubic feet. The sulfur content of propane can be estimated as 0.18.

Potential emissions from the boiler are calculated using Equation 4.4, the emission factors from Tables 4-5 and 4-6, and heat input from Table 1-1. The results are shown in Table 4-7.

Equation 4.4 – Potential Boiler Emissions

$$Potential\ Emissions\left(\frac{tons}{year}\right) = \frac{Heat\ Input\left(\frac{MMBtu}{hour}\right) \times Emission\ Factor\left(\frac{pounds}{MMBtu}\right) \times 8{,}760\left(\frac{hours}{year}\right)}{2{,}000\left(\frac{pounds}{ton}\right)}$$

Table 4-7 – Potential Emissions from Boilers (tons per year)

Unit	TSP	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	VOC
Natural Gas							
Boiler	0.10	0.10	0.10	0.01	1.29	1.08	0.07
Propane							
Boiler	0.10	0.10	0.10	0.00	1.87	1.08	0.11

4.1.4 Summary of Potential Emissions

Table 4-8 summarizes the facility-wide potential emissions.

Table 4-8 – Facility-wide Potential Emissions (tons per year)

Unit	TSP	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	VOC	H_2S
Digester	-	-	-	-	-	-	-	57.57
Flare	1.70	1.70	1.70	107.62	3.80	5.80	0.41	-
Boiler	0.10	0.10	0.10	0.01	1.87	1.08	0.11	-
Total	**2**	**2**	**2**	**108**	**6**	**7**	**1**	**58**

The threshold for Title V pollutants is 100 tons per 12-month rolling period; therefore, the hydrogen sulfide emissions are only considered when the potential emissions are greater than 100 tons per year. The hydrogen sulfide potential emissions are not greater than 100 tons, consequently, venting, and other emissions sources for hydrogen sulfide will not be considered.

Based on Table 4-8, Brookings Biogas has the potential to emit greater than 100 tons per year for sulfur dioxide. However, Brookings Biogas agreed to accept an enforceable sulfur dioxide emission limit to be at or below the 79 tons per year threshold. To meet this limit, Brookings Biogas requested to keep its federally enforceable hydrogen sulfide content limit.

The potential limited sulfur dioxide emissions from the flare will be calculated based on the biogas production rate, Equation 4.3, and the limited emission factor from Table 4-3. The results are shown in Table 4-9.

Table 4-9 – Facility-wide Limited Potential Emissions (tons per year)

Unit	TSP	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	VOC	H_2S
Digesters	-	-	-	-	-	-	-	76.76
Flare	1.80	1.80	1.80	74.50	4.03	6.15	0.44	-
Boiler[1]	0.17	0.17	0.17	0.01	3.11	1.80	0.19	-
Total	**2**	**2**	**2**	**75**	**7**	**8**	**1**	**77**

[1] – Total potential emissions are based on the highest emitting fuel for each pollutant.

4.2 Significant Deterioration Summary

Based on Table 4-9 with the limits on sulfur dioxide and hydrogen sulfide, Brookings Biogas's potential emissions are less than 250 tons per year. Therefore, Brookings Biogas is considered a minor source and is not applicable to the Prevention of Significant Deterioration program. As Brookings Biogas is not applicable to the Prevention of Significant Deterioration program, a review for greenhouse gas emissions is not warranted or required.

5.0 National Emissions Standards for Hazardous Air Pollutants

DANR reviewed the National Emission Standards for Hazardous Air Pollutants under 40 CFR Part 61 and determined there are no standards applicable to Brookings Biogas's renewable natural gas facility.

6.0 Maximum Achievable Control Technology Standards

The federal Maximum Achievable Control Technology Standards are applicable to both major and area sources of hazardous air pollutants. A major source of hazardous air pollutants is defined as having the potential to emit 10 tons or more per year of a single hazardous air pollutant or 25 tons per year or more of a combination of hazardous air pollutants. An area source is a source that is not a major source of hazardous air pollutants.

6.1 Potential Hazardous Air Pollutant Emissions

DANR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DANR relies on manufacturing data, material balance, EPA's Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant's application, or other methods to determine potential air emissions.

6.1.1 Potential Hazardous Air Pollutant Emissions – Anaerobic Digesters

Based on the current available information, the digesters do not produce hazardous air pollutants. Therefore, no hazardous air pollutant emission calculations will be conducted for the digesters.

6.1.2 Potential Hazardous Air Pollutant Emissions – Biogas Flare

Brookings Biogas operates a flare to control biogas emissions during the processing. Because AP-42 does not provide hazardous air pollutant emission factors for biogas combustion, DANR will use the hazardous air pollutant emission factor for natural gas combustion. The hazardous air pollutant emission factor for natural gas combustion is derived from AP-42, 1.4, Table 1.4-3, July 1998, and is displayed in Table 6-1.

Table 6-1 – Emission Factors Natural Gas Combustion

	Hazardous Air Pollutants
Pounds per million cubic feet	1.888

Potential hazardous air pollutant emissions from the flare are calculated using Equation 4.3, the hazardous air pollutant emission factor from Table 6-1, and gas consumption rate of the flare. The results are shown in Table 6-2.

Table 6-2 – Potential Emissions from Flare (tons per year)

Description	**Hazardous Air Pollutants**
Flare	0.19

6.1.3 Potential Hazardous Air Pollutant Emissions - Boiler

Brookings Biogas operates a natural gas and propane-fired boiler. AP-42 does not provide hazardous air pollutant emission factors for propane combustion; therefore, DANR will only calculate emissions for natural gas combustion. The hazardous air pollutant emission factor for natural gas combustion is derived from AP-42, 1.4, Table 1.4-3, July 1998, and is displayed in Table 6-3.

Table 6-3 – Emission Factors Natural Gas Combustion for Boilers

	HAPs
Pounds per million cubic feet[1]	1.888
Pounds per million Btu	0.0018

[1] – To convert from pounds per million gallons to pounds per million Btu, divide by 1,020.

Potential hazardous air pollutant emissions from the boilers are calculated using Equation 4.4, the hazardous air pollutant emission factor from Table 6-3, and heat input from Table 1-1. The results are shown in Table 6-4.

Table 6-4 – Potential Emissions from Boilers (tons per year)

Unit	**HAPs**
Boiler	0.02

6.1.4 Summary of Potential Hazardous Air Pollutant Emissions

Table 6-5 provides a summary of the facility-wide potential hazardous air pollutant emissions.

Table 6-5 – Potential Emissions (tons per year)

Description	Hazardous Air Pollutants
Digesters	-
Flare	0.19
Boilers	0.02
Total	**0.21**

The potential hazardous air pollutant emissions are less than 10 tons per year for a single hazardous air pollutant and 25 tons per year for a combination of hazardous air pollutants. Therefore, Brookings Biogas is an area source of hazardous air pollutants.

6.2 Maximum Achievable Control Technology Standards

DANR reviewed the Maximum Achievable Control Technology standards under 40 CFR Part 63 and determined the following standards may be applicable to Brookings Biogas's facility.

6.2.1 Standards for Off-Site Waste and Recovery Operations – Subpart DD

The provisions of this subpart are applicable to owners and operators of plant sites that are a major source of hazardous air pollutants; and at the plant site is located one or more operations that receives off-site materials, and the operations is one off the waste management operations or recovery operations listed in the subpart. Brookings Biogas is considered an area source of hazardous air pollutants. Therefore, this subpart is not applicable to the facility.

6.2.2 Standards Applicable to Oil and Natural Gas Production Facilities – Subpart HH

The provisions of this subpart apply to owners and operators of emission points located at oil and natural gas production facilities that meet the specified criteria. For area sources, the affected source includes each triethylene glycol (TEG) dehydration unit located at the facility that meets the criteria. Brookings Biogas is an area source of hazardous air pollutants. Brookings Biogas does not operate a TEG dehydration unit; therefore, this subpart is not applicable to the facility.

6.2.3 Standards Applicable to Natural Gas Transmission and Storage – Subpart HHH

The provisions of this subpart are applicable to owners and operators of natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company), and that are major sources of hazardous air pollutants. Brookings Biogas is considered an area source of hazardous air pollutants. Therefore, this subpart is not applicable to the facility.

6.2.4 Standards Applicable to Boilers – Subpart DDDDD

The provisions of this subpart establish national emission and operating limits for hazardous air pollutants emitted from industrial, commercial, and institutional boilers and process heaters located at a major source of hazardous air pollutant emissions. Brookings Biogas is considered an area source of hazardous air pollutants. Therefore, this subpart is not applicable to the facility.

6.2.5 Standards Applicable to Boilers – Subpart JJJJJJ

On March 21, 2011, EPA finalized the Maximum Achievable Control Technology standard under 40 CFR Part 63, Subpart JJJJJJ. This rule applies to all new or existing industrial, commercial, and institutional boilers located at an area source of hazardous air pollutants. An existing boiler is defined as a boiler where construction or reconstruction occurred prior to June 4, 2010.

Brookings Biogas operates three natural gas fired boilers constructed after 2010. In accordance with 40 CFR § 63.11195(e), a gas-fired boiler is exempt from the requirements of this subpart. A gas-fired boiler is defined as "…any boiler that burns gaseous fuels not combined with any solid fuels, burns liquid fuel only during periods of gas curtailment, gas supply emergencies, or periodic testing on liquid fuel". Gaseous fuels include propane. Therefore, Brookings Biogas is not subject to this subpart provided natural gas and propane are the only fuels burned in the boiler.

6.2.6 Other Maximum Achievable Control Technology Standards

DANR reviewed the other Maximum Achievable Control Technology Standards and determined there are no other standards applicable to Brookings Biogas at this time.

7.0 State Requirements

7.1 Permit Type

Any source operating in South Dakota that meets the definition of a major source for any criteria pollutant is required to obtain a Title V air quality operating permit. A major source is defined as having the potential to emit greater than 100 tons per year of a criteria pollutant, greater than or equal to 10 tons per year of a single hazardous air pollutant, or greater than or equal to 25 tons per year of a combination of hazardous air pollutants, or if the source is applicable to a New Source Performance Standards or Maximum Achievable Control Technology Standards. Based on Table 4-9, Brookings Biogas's potential emissions with limits are less than 100 tons per year for any criteria pollutant. Therefore, a Title V air quality operating permit is not required due to criteria pollutant emissions.

Any source operating in South Dakota that meets the definition of a minor source under Administrative Rules of South Dakota 74:36:01:01(37) is required to obtain a minor air quality permit. In accordance with Administrative Rules of South Dakota 74:36:04:02.01, a minor

source is exempt from obtaining a minor source operating permit if the source has the potential to emit 25 tons per year or less of any criteria pollutant, except lead, before the application of control equipment. As shown in Table 4-9, the potential emissions of a single criteria air pollutant are greater than 25 tons per year. Therefore, Brookings Biogas is required to obtain a minor air quality operating permit.

The minor air quality operating permit and the modified air quality construction permit will contain conditions that will limit biogas hydrogen sulfide content to a maximum of 4,500 parts per million. There will also be a condition that will limit actual sulfur dioxide emissions to less than or equal to 79 tons per year. Brookings Biogas will be required to test the hydrogen sulfide content of the biogas on a weekly basis, when the flare is in operation, to ensure the monthly average is below the sulfur content limits. Brookings Biogas will also be required to submit quarterly reports.

7.2 Insignificant Activities

In accordance with Administrative Rules of South Dakota (ARSD) 74:36:20:04 and 74:36:04:03, the following emission units are exempt from inclusion in the air quality operating permit unless the source has requested federally enforceable permit conditions related to the emission unit to avoid needing a Part 70 operating permit, Prevention of Significant Deterioration preconstruction permit, or New Source Review preconstruction permit:

1. One or more incinerators of less than 100 pounds per hour combined burning capacity that combust municipal or household waste;
2. A mobile internal combustion engine, including engines in autos, trucks, tractors, airplanes, locomotives, and boats;
3. Laboratory equipment used exclusively for chemical or physical analysis;
4. A unit that has a heat input capability of not more than 3,500,000 Btu per hour, except for units fueled with wood or coal;
5. An air conditioning or ventilating system not designed to remove air pollutants from equipment;
6. Routine housekeeping or plant upkeep activities such as painting buildings, retarring roofs, or paving parking lots;
7. A unit that has the potential to emit two tons or less per year of any criteria pollutant before the application of control equipment. However, the criteria pollutant emissions from the unit must be included in determining whether the source is a major source; and
8. A unit that has the potential to emit two tons or less per year of any hazardous air pollutant. However, the hazardous air pollutant emissions from the unit must be included in determining whether the source is a major source.

The project includes anaerobic digesters. The digesters only emit hydrogen sulfide. Hydrogen sulfide potential emissions are below 100 tons per year; therefore, venting, and other non-combustion releases of hydrogen sulfide are insignificant. Since hydrogen sulfide emissions are insignificant, the anaerobic digesters are not required to be permitted.

DANR considers potential emissions to the nearest whole ton; therefore, Brookings Biogas's boiler has the potential to emit two tons or less than per year of any criteria air pollutant. As such Brookings Biogas's boiler is considered exempt from permitting.

7.3 State Emission Limits

Administrative Rules of South Dakota 74:36:06:02 establishes state emission limits for total suspended particulate matter and sulfur dioxide. State emission limits are applicable to fuel burning and process industry units. Units classified as insignificant activities are not applicable to the state emission limits. In accordance with Administrative Rules of South Dakota 74:36:01:01(31), a fuel burning unit means a furnace, boiler, apparatus, stack, or any of their components used in the process of burning fuel or other combustible material for the primary purposes of producing heat or power by indirect heat transfer. The flare uses direct heat to burn the gas from the digesters. The flare is not used to heat or power any other units or operations; therefore, the state emission limits for particulate matter or sulfur dioxide emissions are not applicable. As part of modifying the air quality construction permit, DANR will modify the state emission limits to remove Unit #1 due to the unit being exempt from the emission limits.

7.3.1 Visible Emission Limit

Visible emissions are applicable to units that discharge into the ambient air. In accordance with Administrative Rules of South Dakota 74:36:12, a facility may not discharge into the ambient air more than 20 percent opacity for all units. Brookings Biogas must control the opacity at less than 20 percent for all units.

7.4 Performance Tests

In accordance with Administrative Rules of South Dakota 74:36:11:02, the Secretary may require a performance test, if necessary, to demonstrate compliance with the state's emission limits. The air quality construction permit will contain a hydrogen sulfide concentration limit. Compliance with this limit will be based on periodic hydrogen sulfide content testing of the biogas being routed out of the digester. Therefore, a performance test will not be required. However, permit conditions will be included in the permit that will allow DANR to require a performance test if DANR believes a performance test in necessary in the future to demonstrate compliance.

7.5 Standards for Flares

Typically, DANR includes flare requirements, from 40 CFR Part 60.18(b), in the permit. However, the flare requirements are more related to flares used specifically as control devices. The flare at Brookings Biogas's facility will be used to burn biogas and not for controlling a process in order to meet a permit limit. Brookings Biogas will not have a limit based specifically on the flare operating. Therefore, DANR will not include the flare requirements in the permit.

8.0 Recommendation

Brookings Biogas is required to operate the renewable natural gas facility within the requirements stipulated in the following regulations:

- ARSD 74:36:04 – Operating Permits for Minor Sources;
- ARSD 74:36:06 – Regulated Air Pollutant Emissions;
- ARSD 74:36:11 – Performance Testing;
- ARSD 74:36:12 – Control of Visible Emissions; and
- ARSD 74:36:20 – Construction Permits for New Sources or Modifications.

Based on the information submitted in the air quality permit application, DANR recommends approval of a minor air quality operating permit and a modified air quality construction permit for Brookings Biogas's renewable natural gas facility near Bruce, South Dakota. The proposed permit changes to air quality construction permit #28.000150-01C can be seen in Appendix A. Questions regarding this permit review should be directed to Connor Weber, Engineer II, Department of Agriculture and Natural Resources – Air Quality Program.

Appendix A
Modifications to Air Quality Construction Permit #28.000150-01C

The following changes to the existing permit represent changes that meet the definition of a permit modification. Additions to the existing permit are represented in blue, bold, and underlined and deletions are represented in red with overstrikes. In the case where permit conditions are deleted or added between permit conditions, the permit conditions will be renumbered appropriately when the permit is issued.

Under the South Dakota Air Pollution Control Regulations

Pursuant to Chapter 34A-1-21 of the South Dakota Codified Laws and the Air Pollution Control Regulations of the State of South Dakota and in reliance on statements made by the owner designated below, a permit to construct and operate is hereby issued by the Secretary of the Department of Agriculture and Natural Resources. This permit authorizes such owner to construct and operate the permitted unit(s) at the location designated below and under the listed conditions.

A. Owner

1. Company Name and Mailing Address

Brookings Biogas LLC – Hammink Dairy
500 North Akard Street, Suite 1500
Dallas, Texas 75201

1. Actual Source Location if Different from Above

19890 470th Avenue
Bruce, South Dakota 57220

2. Permit Contact

~~Jeff Lippert, Director of Operations and Maintenance~~ **Phil Cherry, General Manager**
~~(415) 463-1333, ext. 109~~**(512) 534-8013**

3. Facility Contact

~~Jeff Lippert, Director of Operations and Maintenance~~ **Phil Cherry, General Manager**
~~(415) 463-1333, ext. 109~~**(512) 534-8013**

4. Responsible Official

Steve Compton, President
(415) 450-7232

B. Permit Revisions

~~Not applicable~~ **Updating contacts, hydrogen sulfide limit, and the compliance demonstration for the short-term sulfur limit.**

C. Description of Construction Activity

Biogas production facility

1.0 Standard Conditions

1.1 Construction and operation of source

In accordance with Administrative Rules of South Dakota (ARSD) 74:36:20:15(9), the owner or operator shall construct and operate the units, controls, and processes as described in Table 1-1 in accordance with the statements, representations, and supporting data contained in the complete permit application received May 25, 2022**, and December 1, 2025**, unless modified by the conditions of this permit. Except as otherwise provided herein, the control equipment in Table 1-1 shall be operated at all times in accordance with the manufacturer's specification and in a manner that achieves compliance with the conditions of this permit. The application consists of the application forms, supporting data, and supplementary correspondence. If the owner or operator becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in an application, such information shall be promptly submitted.

Table 1-1 – Description of Permitted Units, Operations, and Processes

Unit	Description	Maximum Operating Rate	Control Device
#1	Hammink Flare	15 million Btus per hour	Not applicable

4.0 Recordkeeping and Reporting

4.4 Monthly records

In accordance with ARSD 74:36:20:15(10), the owner or operator shall calculate and record the following amounts each month:

1. The amount of sulfur dioxide, in tons, emitted into the ambient air from the permitted units during the month. A 12-month rolling total shall be calculated every month using that months' value and the previous 11 months' values. The amount of sulfur dioxide emitted to the ambient air from permitted units shall be calculated **using a mass balance equation incorporating the sulfur content of biogas determined by the records in permit conditions 4.4(3);**~~using sulfur content of raw biogas, formulas, emission factors, and methods described in the statement of basis;~~

2. The **volume of biogas combusted in** ~~number of hours~~ the flare**, Unit #1,** ~~is operated~~ during the month**. A 12-month rolling total shall be calculated every month using that month's value and the previous 11 months' values**;
3. Sulfur content of biogas as determined by **averaging the weekly sulfur content testing described in permit condition 6.3** ~~sulfur content testing~~; ~~and~~
4. The amount of biogas produced during the month ~~and during the 12-month period for that month~~. **A 12-month rolling total shall be calculated every month using that month's value and the previous 11 months' values; and**
5. **Instances where the facility is not operating, and a sulfur content reading is not taken.**

4.5 Quarterly reporting

In accordance with ARSD 74:36:20:15(10), the owner or operator shall submit ~~a~~ quarterly report**s** to the Secretary ~~by the end of each calendar quarter~~. The quarterly report**s** shall contain the following information:

1. Name of facility, permit number, reference to this permit condition, identifying the submittal as a quarterly report, and calendar dates covered in the reporting period;
2. The amount of sulfur dioxide emissions, in tons, emitted into the ambient air from the permitted units during ~~the~~ **each** month and ~~during each~~ **the** 12-month **rolling total** ~~period~~ for ~~that~~ **each** month **in the reporting period**;
3. **Monthly average sulfur content of biogas as determined by every weekly sulfur content test taken during the calendar month as described in permit condition 6.3**~~Quarterly average sulfur content of biogas as determined by sulfur content testing~~;
4. The **volume of biogas combusted in** ~~number of hours~~ the flare**, Unit #1,** ~~operated during the~~ **each** month and ~~during each~~ **the** 12-month **rolling total** ~~period~~ for ~~that~~ **each** month **in the reporting period**;
5. **Instances where the facility is not operating, and a sulfur content reading is not taken;** and
6. The amount of biogas produced during ~~the~~ **each** month and ~~during each~~ **the** 12-month **rolling total** ~~period~~ for ~~that~~ **each** month **in the reporting period**.

The quarterly report must be postmarked no later than 30 days after the end of the reporting period (i.e., April 30th, July 30th, October 30th, and January 30th).

5.0 Control of Regulated Air Pollutants

~~**5.3 Total suspended particulate matter limits**~~

~~In accordance with ARSD 74:36:06:02(1) and/or ARSD 74:36:06:03(1), the owner or operator shall not allow the emission of total suspended particulate matter in excess of the emission limit specified in Table 5-1 for the appropriate permitted unit, operations, and process.~~

~~***Table 5-1 – Total Suspended Particulate Emission Limit***~~

~~Unit~~	~~Description~~	~~Emission Limit~~
~~#1~~	~~Flare~~	~~0.6 pounds per million Btu heat input~~

~~5.4 Sulfur dioxide limits~~

~~In accordance with ARSD 74:36:06:02(2) and/or ARSD 74:36:06:03(2), the owner or operator shall not allow the emission of sulfur dioxide in excess of the emission limit specified in Table 5-2 for the appropriate permitted unit, operations, and process.~~

~~*Table 5-2 – Sulfur Dioxide Emission Limit*~~

~~Unit~~	~~Description~~	~~Emission Limit~~
~~#1~~	~~Flare~~	~~3.0 pounds per million Btu heat input~~

~~Compliance with the sulfur dioxide emission limit is based on a three-hour rolling average, which is the arithmetic average of three contiguous one-hour periods.~~

5.~~5~~3 Circumvention not allowed

In accordance with ARSD 74:36:20:24, the owner or operator may not install, use a device, or use a means that conceals or dilutes an air emission that would otherwise violate this permit. This includes operating a unit or control device that emits air pollutants from an opening other than the designed stack, vent, or equivalent opening.

5.~~6~~4 Minimizing emissions

In accordance with ARSD 74:36:20:15(9), the owner or operator shall at all time, when practicable, maintain and operate all permitted units in a manner that minimizes air pollution emissions.

6.0 ~~Operating Limits~~ Title V Air Quality Operating Permit Exemption

6.1 Plant-wide sulfur dioxide limit

In accordance with ARSD 74:36:20:15(9), the owner or operator shall not emit into the ambient air greater than or equal to 79 tons per 12-month rolling period of sulfur dioxide. Compliance with this limit is determined by meeting the sulfur content of biogas limit in permit condition 6.2.

6.~~1~~2 Sulfur content limit

In accordance with ARSD 74:36:20:15(9), the owner or operator shall not ~~burn~~ **combust** biogas with a ~~sulfur~~ **hydrogen sulfide** content greater than 4,500 parts per million, determined on a ~~quarterly~~ **monthly** average basis, as described in permit condition 6.~~2~~3.

~~**6.2 Monitoring sulfur content of biogas quarterly**~~

~~In accordance with ARSD 74:36:20:15(10), the owner or operator shall collect samples of the inlet biogas for the flare during the quarter to determine the average sulfur content. Samples shall be collected on a monthly or more frequent basis to calculate the quarterly average sulfur content. The sample shall be collected at a point between the anaerobic digesters and the flare inlet. A copy of the analyses shall be submitted with quarterly reports.~~

6.3 Monitoring sulfur content of biogas monthly

In accordance with ARSD 74:36:20:15(10), the owner or operator shall collect samples of

the biogas prior to combustion during the calendar month to determine the average sulfur content. Samples shall be collected on a weekly or more frequent basis to calculate the monthly average sulfur content. If the facility is not operated during a week, then a sulfur content sample will not be required that week. The monthly average is to be calculated using each sulfur content sample taken during the month while the facility was in operation. The samples shall be collected at a point prior to combustion and be conducted by either an EPA approved test method or a portable analyzer. The samples shall be analyzed by an EPA approved test method (e.g., ASTM D5504, D4468, D1072, etc.) or a portable analyzer. If a portable analyzer is used, the portable analyzer must be maintained based on the manufacturer's instructions and certified annually. If the monthly average result from the portable analyzer indicates exceedance of the sulfur content limit in permit condition 6.2, the owner or operator shall analyze the samples using an EPA approved test method. A copy of all analyses' results shall be submitted with quarterly reports.