NORTH CAROLINA DIVISION OF AIR QUALITY Application Review **Issue Date: XX/XX/XXXX**	**Region:** Wilmington Regional Office **County:** Duplin **NC Facility ID:** 3100179 **Inspector's Name:** TBD **Date of Last Inspection:** TBD **Compliance Code:** TBD
Facility Data **Applicant (Facility's Name):** Align RNG, LLC - BF Grady Road **Facility Address:** (BF Grady Road) 2940 NC Highway 24 west Turkey, NC 28393 **SIC:** 1321/ Natural Gas Liquids **NAICS:** 211130/ Natural Gas Extraction **Facility Classification: Before:** Permit/Registration Pending **After:** Synth Min **Fee Classification: Before:** N/A **After:** Synthetic Minor	**Permit Applicability (this application only)** **SIP:** X **NSPS:** **NESHAP:** **PSD:** **PSD Avoidance:** X **NC Toxics:** **112(r):** **Other:**

Contact Data			Application Data
Facility Contact	**Authorized Contact**	**Technical Contact**	**Application Number:** 3100179.19A **Date Received:** 12/10/2019 **Application Type:** Greenfield Facility **Application Schedule:** State **Existing Permit Data** **Existing Permit Number:** N/A **Existing Permit Issue Date:** N/A **Existing Permit Expiration Date:** N/A
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Review Engineer: Dean Carroll **Review Engineer's Signature:** **Date:**	**Comments / Recommendations:** **Issue:** 10644/R00 **Permit Issue Date:** XX/XX/XXXX **Permit Expiration Date:** XX/XX/XXXX

1. Purpose of Application # 31/00179.19A

This application was submitted by Mr. Kraig Westerbeek, VP of Environmental and Manufacturing, for an initial permit (greenfield facility) for BF Grady Road facility in Warsaw, NC, Duplin County. The parent company (Entity) for this facility is Align RNG, LLC in Richmond, VA. RNG is renewable natural gas. The actual location of the facility will be at 2940 NC Highway 24 West in Turkey, NC.

2. Facility Description

This application is for a new facility which plans to receive biogas produced in anaerobic digesters at various independently owned and operated hog farms located in Duplin and Sampson counties. The projected biogas production amount has been calculated from other similar anaerobic digesters in NC using hog manure as the sole feedstock. The biogas (raw material) will be dried using biogas dehydration and compression systems (and a glycol chiller system) at each farm (roughly 19 total) and transported through low-pressure (< 10 psig) biogas collector lines to the BF Grady Rd facility.

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The biogas will be conditioned to renewable natural gas quality and injected into the Piedmont Natural Gas pipeline for offsite consumption. The non-methane constituents of the biogas, referred to as tail gas, will be scrubbed for hydrogen sulfide (H_2S) using an iron sponge system (two iron sponge scrubbers, CD-1 and CD-2 in parallel), followed by one enclosed hybrid flare (CD-3). This constitutes normal operation. See the Source Emissions permit equipment table below for a description of the three (3) possible scenarios at this facility.

In the application, the nearest farm to the BF Grady Rd biogas facility was given as 1.1 miles (direct linear distance, "as the crow flies") and the farthest farm to the facility was given as 20 miles (direct linear distance, "as the crow flies").

3. Application Chronology

December 10, 2019 – Application, $400.00 fee, and zoning consistency request received.

December 12, 2019 – Acknowledgement letter sent to the applicant.

January 17, 2020 – Completeness Add Info letter sent to the Applicant dealing with compliance issues with DAQ regulation 15A NCAC 2D .0516 (SO2 Emissions).

February 27, 2020 – First Add Info response letter received from the Applicant.

March 18, 2020 – Secondary Add Info letter sent to the Applicant dealing with various equipment operations and parametric monitors and evaluation.

March 27, 2020 – Secondary Add Info letter response received from the Applicant.

May 16, 2020 – public notice published in the Sampson Independent newspaper (30-day comment period initiated).

May 21, 2020 – public notice published in the Duplin Times newspaper (30-day comment period).

June 16, 2020 – End of public comment period. 558 comments were received

August 7, 2020 – DAQ decision is made to hold a virtual public hearing on this draft permit.

August 19, 2020 – final version of the permit and the review document submitted to RCO.

August WXY, 2020 – pending 30-day comment period and notice for virtual public hearing. *Comments received during the initial June comment period are still under consideration. Feedback from hearing and second comment period will be combined with initial public comments. All comments will be included and addressed in Hearing Officer's report.*

4. Source Emissions

The following sources were requested to be permitted. The level of detail in this permit review is more extensive than in the permit, for the sole purpose of explaining the technical nature of the biogas process.

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Emission Source ID	Emission Source Description	Control System ID	Control System Description
ES-1 GUS Scenario 1 Normal Operation (Including Start-Up Situations) During Start-Up, no gas is sent to the candlestick flare (CD-4). The methane is recycled within the plant (through the two scrubbers) to build pressure in the plant to the correct operating level and tail gas continues to go to the enclosed hybrid flare CD-3.	one Gas Upgrading System (ES-1 GUS) - Normal Operation: consisting of a pressure swing adsorption (PSA) media system that chemically and physically segregates the constituents of the biogas (raw material) at a molecular level (molecular sieve using patented Molecular Gate™ adsorbent) when under pressure (approx. 100 psig). This particular PSA media was designed to optimally segregate methane from carbon dioxide and other biogas constituents. The methane and a minor portion of other biogas constituents are delivered to the natural gas pipeline (as product gas), and the remaining biogas constituents (tail gas) are directed to the iron sponges and enclosed hybrid flare. (8,760 hours/year max)	CD-1 (CD1 and CD2 are in parallel and may operate simultaneously)	one iron sponge (scrubber) system vessel with fixed bed media (iron oxide) for hydrogen sulfide removal
		CD-2 (CD1 and CD2 are in parallel and may operate simultaneously)	one iron sponge (scrubber) system vessel with fixed bed media (iron oxide) for hydrogen sulfide removal
		CD-3 Enclosed Hybrid Flare receives treated tail gas from the iron sponge system vessels and untreated tail gas directly from the ES-1 GUS. This flare is used for tail gas combustion	one enclosed hybrid flare (John Zink unit, 10 MM Btu/hr heat input, 2020 model year) for the combustion of tail gas that has been treated by CD-1 and/or CD-2. The flare uses natural gas as supplemental fuel to keep it at operating temperature. (this flare may also combust bypass tail gas directly from the ES-1 GUS.)
ES-1 GUS Scenario 2 Off-Specification Gas	one Gas Upgrading System (ES-1 GUS) - Off-Specification Production Operation: the segregated methane and a minor portion of other biogas constituents (off-spec product gas) are incapable of being delivered to the natural gas pipeline due to nonconformance with the utility's specification for gas, and thus, the off-spec gas is combusted in the candlestick flare (CD-4). The remaining biogas constituents (tail gas) are directed to the scrubbers (CD-1 and CD-2) and enclosed hybrid flare (CD-3). (Note: the actual type of media in the iron sponges is wood chips impregnated with iron oxide. The hydrogen sulfide gas is converted to iron sulfide which remains in the media bed)	CD-1 (CD1 and CD2 are in parallel and may operate simultaneously)	two iron sponges, CD-1 and CD-2 (scrubbers) with fixed bed media (iron oxide) for hydrogen sulfide removal
		CD-2 (CD1 and CD2 are in parallel and may operate simultaneously)	
		CD-3 Enclosed Hybrid Flare receives treated tail gas from the iron sponge system vessels and untreated tail gas directly from the GUS. (Note: A small portion of the total tail gas flow may bypass the iron sponge scrubbers and the facility will remain in compliance.)	one enclosed hybrid flare (CD-3 John Zink unit, 10 MM Btu/hr heat input, 2020 model year) for the combustion of tail gas that has been treated by CD-1 and/or CD-2
		CD-4	

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Emission Source ID	Emission Source Description	Control System ID	Control System Description
		Candlestick Flare receives Off-Spec product gas from the ES-1 GUS	one elevated candlestick flare (CD-4, ProPump unit, 45 MM Btu/hr heat input, 2020 model year) for the combustion of biogas during equipment repair or maintenance
ES-1 GUS Scenario 3 By-Pass Biogas	one Gas Upgrading System (ES-1 GUS); In By-Pass Biogas operation, the Gas Upgrading System is not in operation and the facility must direct biogas to CD-4. (240 hours/year max)	CD-4 Candlestick Flare receives biogas that is not processed by the ES-1 GUS	one elevated candlestick flare (ProPump unit, 45 MM Btu/hr heat input, 2020 model year) for the combustion of biogas during equipment repair or maintenance

Actual and Potential to Emit (PTE) Emissions from the Application (D1 Form):

Pollutant	Actual (tons/year)	Potential to Emit (tons/year)
CO	10.10	17.39
NOx	4.83	6.54
PM(TSP)	0.07	0.14
PM(10)	0.07	0.14
PM(2.5)	0.06	0.12
SO2	**50 projected**	**197**
VOC	0.76	1.53

This facility will be classified as a synthetic minor due to SO2 PTE > 100 tpy. The facility will accept federally enforceable limits and emission controls to reduce the potential emissions to be below 100 tons/yr. levels.

5. Applicable Regulations

The proposed facility will be subject to: Title 15A North Carolina Administrative Code (NCAC), Subchapter 2D .0202, 2D .0516, 2D .0535, 2D .0540, 2Q .0315 (synthetic minor), and 2Q .0317 (PSD avoidance). Each regulation will be shown as it is presented in the actual permit in italics:

1. *Any air emission sources or control devices authorized to construct and operate above must be operated and maintained in accordance with the provisions contained herein. The Permittee shall comply with applicable Environmental Management Commission Regulations, including Title 15A North Carolina Administrative Code (NCAC), Subchapter 2D .0202, 2D .0516, 2D .0535, 2D .0540, 2Q .0315, and 2Q .0317 (PSD avoidance).*

2. *PERMIT RENEWAL AND EMISSION INVENTORY REQUIREMENT - The Permittee, at least **90** days prior to the expiration date of this permit, shall request permit renewal by letter in accordance with 15A NCAC 2Q .0304(d) and (f). Pursuant to 15A NCAC 2Q .0203(i), no permit application fee is required for renewal of an existing air permit (without a modification request). The renewal request (with application Form A) should be submitted to the Regional Supervisor, DAQ. Also, at least **90** days prior to the expiration date of this permit, the Permittee shall submit the air pollution emission inventory report (with Certification Sheet) in accordance with 15A NCAC 2D .0202, pursuant to N.C. General Statute 143 215.65. The report shall be submitted to the Regional Supervisor, DAQ and shall document air pollutants emitted for the **2026** calendar year.*

3. *SULFUR DIOXIDE CONTROL REQUIREMENT - As required by 15A NCAC 2D .0516 "Sulfur Dioxide Emissions from Combustion Sources," sulfur dioxide emissions from one Gas Upgrading System (ID No. ES-1 GUS) and the facility flares (CD-3 and CD-4) shall not exceed 2.3 pounds per million Btu heat input.*

   In order to comply with the SO_2 limit of 2.3 lbs/MMBtu heat input, a limitation of the hydrogen sulfide (lb/hr H_2S) to the combustion source CD-3 (10MM Btu/hr heat input hybrid flare) is required. To ensure compliance with this limitation, the following monitoring, recordkeeping, and reporting requirements are required:

   a. *Monitoring: The Permittee shall monitor; the tail gas H_2S concentration (ppm) and flow rate (scfm) from the outlet of emission source (ES-1 GUS), the tail gas flow rate (scfm) to the inlet of the iron sponge scrubbers (CD-1 and CD-2), the H_2S concentration (ppm) from the outlet of the iron sponge scrubbers, and calculate the flow (scfm) of the tail gas bypassing the iron sponge~~s~~ scrubbers (CD-1 and CD-2) once per hour for each day the ES-1 GUS is in operation (see Specific Condition 6). The permittee shall also record the instantaneous natural gas flow rate to CD-3 (scfm) at the same time as the measurements above are taken.*

   b. *Recordkeeping: The Permittee shall record the tail gas H_2S concentration (ppm) and tail gas flow rate (scfm) from the monitoring locations as defined in a. above. The Permittee shall record the calculated H_2S concentration (ppm) and tail gas flow rate (scfm) of the tail gas bypassing the iron sponge scrubbers (CD-1 and CD-2) as defined in a., above. The Permittee shall record the calculated heat input rate (MMBtu/hr) to the enclosed hybrid flare (CD-3) using the tail gas flow rate (scfm) and natural gas flow rate (scfm) recorded from the monitoring locations as defined in a. above. Once per day when the facility is in operation, using the recorded and calculated values from the previous day as defined in this Specific Condition (3.b.), the Permittee shall calculate and record the daily average emission rate of sulfur dioxide per MMBtu input for the enclosed hybrid flare (CD-3). If the emission rate of sulfur dioxide (lb/MMBtu) from CD-3 exceeds the limit defined in 15A NCAC 02D .0516, the Permittee shall be in violation of the permit. The Permittee shall use the following equations to calculate the emission rate of sulfur dioxide per MMBtu input (lb SO_2/MMBtu) for the enclosed hybrid flare (CD-3):*

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Sulfur dioxide emissions (lb/hr) resulting from tail gas and natural gas combustion in the enclosed hybrid flare (CD-3) shall be calculated using the following equation:

$$m_{SO2} = \frac{60 \times MW_{H2S} \times P}{R \times T} \times (Q_{UT} \times PPM_{UT} + Q_T \times PPM_T) \times \frac{MW_{SO2}}{MW_{H2S}} \times OF + \frac{EF \times Q_{NG} \times 60}{10^6} + 0.05$$

where: m_{SO2} *= SO_2 emission rate from CD-3 tail gas and natural gas combustion (lb/hr)*
60 = conversion factor = 60 min/hr
MW_{H2S} *= molecular weight of H_2S (lb/lbmol) = 34.08 lb/lbmol*
P = standard pressure = 14.7 psia
*R = gas constant = 10.73 (psia*ft^3)/(lbmol*R)*
T = standard temperature = 491.67 R
Q_{UT} *= calculated average daily untreated tail gas volumetric flow rate (scfm)*
PPM_{UT} *= measured average daily untreated tail gas H_2S concentration (ppm)*
Q_T *= measured average daily treated tail gas volumetric flow rate (scfm)*
PPM_T *= measured average daily treated tail gas H_2S concentration (ppm)*
MW_{SO2} *= molecular weight of SO_2 (lb/lbmol) = 64.06 lb/lbmol*
OF = H_2S combustion efficiency = 100%[1]
EF = SO_2 emission factor = 0.60 lb/MMscf[2]
Q_{NG} *= measured average daily natural gas volumetric flow rate (scfm)*
10^6 *= conversion factor = 10^6 scf/MMscf*
0.05 = SO_2 emissions resulting from the combustion of trace sulfur compounds (lb/hr)

The heat input rate (MMBtu/hr) resulting from tail gas and natural gas delivery to the enclosed hybrid flare (CD-3) shall be calculated using the following equation:

$$q = HV_{TG} \times Q_{GUS} \times \frac{60}{10^6} + HV_{NG} \times Q_{NG} \times \frac{60}{10^6}$$

where: q *= heat input rate to CD-3 from tail gas and natural gas combustion (MMBtu/hr)*
HV_{TG} *= expected average tail gas heating value = 69.6 Btu/scf*
Q_{GUS} *= measured average daily total tail gas volumetric flow rate (scfm)*
60 = conversion factor = 60 min/hr
10^6 *= conversion factor = 10^6 scf/MMscf*
HV_{NG} *= natural gas heating value[3] = 1,020 Btu/scf*
Q_{NG} *= measured average daily natural gas volumetric flow rate (scfm)*

[1] Combustion efficiency selected as 100% theoretical maximum, though actual combustion efficiency is likely less (e.g., EPA 40 CFR 60.18 and AP-42 Section 13.5 which states combustion efficiency of 98%).
[2] Emission factor from AP-42 Section 1.4.
[3] Natural gas heating value from AP-42 Section 1.4.1.

The emission rate of sulfur dioxide per MMBtu input (lb SO_2/MMBtu) for the enclosed hybrid flare (CD-3) shall be calculated using the following equation:

$$ER = \frac{m_{SO2}}{q}$$

where: *ER = emission rate of sulfur dioxide per MMBtu input (lb SO_2/MMBtu) for CD-3*
m_{SO2} = SO_2 emission rate from CD-3 tail gas and natural gas combustion (lb/hr)
q = heat input rate to CD-3 from tail gas and natural gas combustion (MMBtu/hr)

c. *Reporting: The Permittee shall notify the Regional Supervisor within five (5) business day if the daily load to CD-3 results in an exceedance of the 2.3 lbs SO2/MMBtu limitation. The data is not required to be reported to the Regional Office but must be maintained on site and immediately available for review by DAQ personnel.*

NOTE: when operating in Scenario 3 mode (By-Pass Operation), the biogas will by-pass the GUS system and will be flared in CD-4 (candlestick flare, 45 MM Btu/hr unit). The allowable SO_2 emission rate for this scenario for this piece of equipment per 2D .0516 would be 2.3 X 45 MM Btu/hr = 103.5 lb/hr SO_2 emissions. The actual emission rate in this scenario calculated by the applicant was 44.08 lb/hr SO2 emissions. Thus, the CD-4 unit is expected to operate in compliance with 15A NCAC 2D .0516.

4. *NOTIFICATION REQUIREMENT - As required by 15A NCAC 2D .0535, the Permittee of a source of excess emissions that last for more than four hours and that results from a malfunction, a breakdown of process or control equipment or any other abnormal conditions, shall:*

   a. *Notify the Director or his designee of any such occurrence by 9:00 a.m. Eastern time of the Division's next business day of becoming aware of the occurrence and describe:*

      i. *the name and location of the facility,*
      ii. *the nature and cause of the malfunction or breakdown,*
      iii. *the time when the malfunction or breakdown is first observed,*
      iv. *the expected duration, and*
      v. *an estimated rate of emissions.*

   b. *Notify the Director or his designee immediately when the corrective measures have been accomplished.*

This reporting requirement does not allow the operation of the facility in excess of Environmental Management Commission Regulations.

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The calculation methods used to calculate the potential annual emissions without controls and limits and the actual annual emissions with controls and limits are provided below. See the secondary add info response letter from BF Grady Rd dated March 27, 2020 for the original response. The actual 2Q .0315 synthetic minor condition language is shown below (Section 6).

The potential to emit (PTE) annual emissions without controls and limits were calculated for the maximum rated inlet flow rate of 1,200 scfm for the Guild PSA system and the maximum expected H_2S concentration of 3,500 ppm for the biogas. The calculations assume 8,760 hours of Normal Operation without H_2S removal in the iron sponge vessels and 600 hours of Off-Spec Operation. The SO_2 emission rates were calculated as follows:

ES-1, Emission Point 1, with CD-3, Potential Emissions (Uncontrolled)

To determine the mass flow rate of H_2S given a biogas flow rate of 1,200 scfm and an H_2S concentration of 3,500 ppm, the following formula was used:

$$m = \frac{60 \times MW \times P \times V \times PPM}{R \times T \times 1{,}000{,}000}$$

Where:
- m = mass flow rate (lb/hr)
- MW = molecular weight (lb/lbmol)
- P = standard pressure = 14.7 psia
- V = flow rate (SCFM)
- PPM = concentration of H_2S (ppm)
- R = gas constant = 10.73 (psia*ft^3)/lbmol*R)
- T = standard temperatura = 481.67 R

For H_2S, m = (60 x 34.08 x 14.7 x 1,200 x 0.0035) / (10.73 x 491.67) = 23.93 lb/hr H_2S.

The 0.0035 factor is used because the maximum expected H_2S concentration for the biogas is 3,500 ppm. At a biogas flow rate of 1,200 scfm, that results in an H_2S flow rate of 1,200 scfm x 0.0035 = 4.2 scfm. (60 minutes/hour conversion factor also used.)

The molecular weight of SO_2 is 64.06. To convert from H_2S to SO_2, the ratio of the MWs was used or 64.06 / 34.08 = 1.88. Therefore, m = 23.93 x 1.88 = 44.98 lb/hr SO_2.

Assuming a 100% combustion efficiency, that equates to 44.98 lb/hr SO_2. For 8,760 operating hours per year, that equals 44.98 x 8,760 / 2000 = **197.01 tons/yr SO_2 uncontrolled emissions**.

In addition to the mass balance above, the SO_2 emission factor from AP-42 Section 1.4, which equals 0.60 lb/MMscf, was used to calculate emissions from the supplemental natural gas to the enclosed flare. The emission rate was calculated by adjusting the emission factor to the average heating value of the tail gas – natural gas mixture which is 165.79 Btu/scf (as a potential worst-case estimate). The maximum rated heat input of 10 MMBtu/hr to the enclosed hybrid flare was used. The emission rate was calculated as 0.6 lb/MMscf / 165.79 Btu/scf x 10 MMBtu/hr x 8,760 hr/yr / 2,000 lb/ton = **0.16 tons/yr**.

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As reported on Calculations Pages 4 and 9 of the March 27, 2020 response, the total uncontrolled SO_2 emission rate from EP-1 is calculated as 197.01 tons/yr + 0.16 tons/yr = **197.17 tons/yr**.

ES-1, Emission Point 2, with CD-4, Potential Emissions (Uncontrolled PTE)
To determine the emissions from 600 hours of product gas combustion in the candlestick flare (CD-4), the SO_2 emission factor from AP-42 Section 1.4, which equals 0.60 lb/MMscf, was used. The emission rate was calculated by adjusting the emission factor to the average heating value of the product gas which is 902.70 Btu/scf. The maximum rated heat input of 45 MMBtu/hr to the candlestick flare was used. The emission rate was calculated as 0.6 lb/MMscf / 902.70 Btu/scf x 45 MMBtu/hr x 600 hr/yr / 2,000 lb/ton = **0.01 tons/yr SO_2**.

As reported on Calculations Pages 4 and 12 of the 02/27/2020 application, the total SO_2 emission rate from EP-2 equals **0.01 tons/yr**.

Therefore, the potential SO_2 emission rate for ES-1 without controls and limits is calculated as 197.17 tons/yr + 0.01 tons/yr = 197.18 tons/yr.

The potential annual emissions with controls and limits were calculated for the maximum rated inlet flow rate of 1,200 scfm for the Guild PSA system and the maximum expected H_2S concentration of 3,500 ppm for the biogas. The calculations assume 8,760 hours of Normal Operation with H_2S removal in the iron sponge vessels, 360 hours of Off-Spec Operation, and 240 hours of Bypass Operation. The SO_2 emission rate was calculated as follows:

ES-1, Emission Point 1, with CD-3, Actual Emissions
To determine the mass flow rate of H_2S given a biogas flow rate of 1,200 scfm and an H_2S concentration of 3,500 ppm, the mass flow rate formula provided above was used.

For H_2S, m = (60 x 34.08 x 14.7 x 1,200 x 0.0035) / (10.73 x 491.67) = 23.93 lb/hr H_2S.

This value is reduced via the two iron sponges which provide a destruction efficiency provided in the application (from the manufacturer) of 77.7% capture efficiency of the biogas and 98.94% destruction efficiency, which equals an overall efficiency of 76.85%. Thus, the **H_2S removal efficiency of 76.85%** in the iron sponge vessels, provides the mass flow rate of H_2S ~~is~~ to be reduced to 23.93 lb/hr x (1-0.7685) = 5.54 lb/hr.

The molecular weight of SO_2 is 64.06. To convert from H_2S to SO_2, the ratio of the MWs was used or 64.06 / 34.08 = 1.88. Therefore, m = 5.54 x 1.88 = 10.41 lb/hr SO_2.

Assuming 100% combustion efficiency, that equates to 10.41 lb/hr SO_2. For 8,760 operating hours per year, that equals 10.41 x 8,760 / 2000 = **45.60 tons/yr SO_2**.

In addition to the mass balance above, the SO_2 emission factor from AP-42 Section 1.4, which equals 0.60 lb/MMscf, was used to calculate emissions from the supplemental natural gas to the enclosed flare (CD-3). The emission rate was calculated by adjusting the emission factor to the average heating value of the tail gas – natural gas mixture which is 165.79 Btu/scf. The expected heat input of 4.92 MMBtu/hr to the enclosed hybrid flare was used. The emission rate was calculated as 0.6 lb/MMscf / 165.79 Btu/scf x 4.92 MMBtu/hr x 8,760 hr/yr / 2,000 lb/ton = **0.08 tons/yr**.

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As reported on Calculations Pages 5 and 9 the total SO_2 emission rate from EP-1 is calculated as 45.60 tons/yr + 0.08 tons/yr = **45.68 tons/yr**.

ES-1, Emission Point 2, with CD-4, Actual Emissions

To determine the emissions from 360 hours of product gas combustion in the candlestick flare (CD-4), the SO_2 emission factor from AP-42 Section 1.4, which equals 0.60 lb/MMscf, was used. The emission rate was calculated by adjusting the emission factor to the average heating value of the product gas which is 902.70 Btu/scf. The expected heat input of 40.98 MMBtu/hr to the candlestick flare was used. The emission rate was calculated as 0.6 lb/MMscf / 902.70 Btu/scf x 40.98 MMBtu/hr x 360 hr/yr / 2,000 lb/ton = **0.005 tons/yr SO_2**.

To determine the emissions from 240 hours of biogas combustion in the candlestick flare (CD-4), a method similar to the method used for calculating emissions from the enclosed hybrid flare was used. To determine the mass flow rate of H_2S given a biogas flow rate of 1,200 scfm and an H_2S concentration of 3,500 ppm, the mass flow rate formula provided above was used.

For H_2S, m = (60 x 34.08 x 14.7 x 1,200 x 0.0035) / (10.73 x 491.67) = 23.93 lb/hr H_2S.

The molecular weight of SO_2 is 64.06. To convert from H_2S to SO_2, the ratio of the MWs was used or 64.06 / 34.08 = 1.88. Therefore, m = 23.93 x 1.88 = 44.98 lb/hr SO_2.

Assuming 100% combustion efficiency, that equates to 44.98 lb/hr SO_2. For 240 operating hours per year, that equals 44.98 x 240 / 2000 = **5.40 tons/yr SO_2**.

In addition to the mass balance above, the SO_2 emission factor from AP-42 Section 1.4, which equals 0.60 lb/MMscf, was used to calculate emissions from the supplemental natural gas to the enclosed flare. The emission rate was calculated by adjusting the emission factor to the average heating value of the biogas which is 594.54 Btu/scf. The expected heat input of 42.84 MMBtu/hr to the enclosed hybrid flare was used. The emission rate was calculated as 0.6 lb/MMscf / 594.54 Btu/scf x 42.84 MMBtu/hr x 240 hr/yr / 2,000 lb/ton = **0.005 tons/yr SO_2**.

As reported on Calculations Page 5 the total SO_2 emission rate from EP-2 is calculated as 0.005 tons/yr + 5.40 tons/yr = **5.41 tons/yr**.

Therefore, the potential SO_2 emission rate for ES-1 with controls and limits is calculated as 45.68 tons/yr + 5.41 tons/yr = 51.09 tons/yr.

As shown in the calculations above and on Calculations Pages 4 and 5 of the Air Quality Permit Application, the potential annual emissions (SO_2) are reduced from 197.18 tons/yr to 51.09 tons/yr by utilizing the iron sponge system for hydrogen sulfide removal. As shown on Form D1 of the Application, the expected actual SO_2 emissions for ES-1 with controls and limits are a range from 47.02 to 50 tons/yr. The actual emissions were calculated for 8,160 hours of Normal Operation, 360 hours of Off-Spec Operation, and 240 hours of Bypass Operation for a total of 8,760 hours of operation per year. It is possible that the BF Grady Rd facility will exceed 8,160 hours of Normal Operation per year which would result in lower emissions.

5. *FUGITIVE DUST CONTROL REQUIREMENT - As required by 15A NCAC 2D .0540 "Particulates from Fugitive Dust Emission Sources," the Permittee shall not cause or allow fugitive dust emissions to cause or contribute to substantive complaints or excess*

visible emissions beyond the property boundary. If substantive complaints are received or excessive fugitive dust emissions from the facility are observed beyond the property boundaries for six minutes in any one hour (using Reference Method 22 in 40 CFR, Appendix A), the owner or operator may be required to submit a fugitive dust plan as described in 2D .0540(f).

"Fugitive dust emissions" means particulate matter that does not pass through a process stack or vent and that is generated within plant property boundaries from activities such as: unloading and loading areas, process areas stockpiles, stock pile working, plant parking lots, and plant roads (including access roads and haul roads).

6. Emissions Limits and Requirements

The synthetic minor condition (A.6.) requires a specific daily/monthly recordkeeping of H_2S concentration (ppm) and SO_2 actual emissions calculated monthly and annually (rolling 12-month total emissions, tons/yr) which shall be reported to DAQ annually. This is because the facility has various components (moving parts) to meet the SO_2 actual emissions (100 ton/yr synthetic minor limitation). The synthetic minor condition will utilize custom language showing flow rates, pressure drop, emission factors (emission rates), and hours of operation.

The 2Q .0315 synthetic minor permit condition is shown below:

A.6. LIMITATION TO AVOID 15A NCAC 2Q .0501 - Pursuant to 15A NCAC 2Q .0315 "Synthetic Minor Facilities," to avoid the applicability of 15A NCAC 2Q .0501 "Purpose of Section and Requirement for a TV Permit," as requested by the Permittee, facility-wide emissions shall be less than the following:

Pollutant	***Emission Limit (Tons per consecutive 12-month period)***
SO_2	*< 100*

a. *Operations Restrictions - To ensure emissions do not exceed the limitations above, the following restrictions shall apply:*

   i. *The SO_2 actual emissions shall be less than 100 ton/yr per consecutive 12-month rolling period.*

b. *Inspection and Maintenance Requirements -*

   i. *H_2S Scrubber Requirements – SO_2 emissions shall be controlled as described in the permitted equipment list. To comply with the provision of this permit and ensure that SO_2 emissions do not exceed the regulatory limits, the Permittee shall perform periodic inspections and maintenance (I&M) as recommended by the manufacturer. In addition, the Permittee shall perform an annual (for each 12 month period following the initial inspection) inspection of each H_2S Scrubber system (CD-1 and CD-2).*

As a minimum, the I&M program and each annual inspection should include the following:

A. Inspect and maintain the structural integrity of each H_2S Scrubber system / iron sponge (CD-1 and CD-2).

B. Inspect and maintain the structural integrity of duct work and piping leading to each H_2S Scrubber system (CD-1 and CD-2).

ii. Enclosed Hybrid Flare and Candlestick Flare Requirements - The Permittee shall perform periodic inspections and maintenance (I&M) as recommended by the manufacturer.

iii. H_2S Monitors - The Permittee shall perform periodic inspections and maintenance (I&M) as recommended by the manufacturer as well as periodic calibrations as recommended by the manufacturer.

iv. Flow Meters - The Permittee shall perform periodic inspections and maintenance (I&M) as recommended by the manufacturer as well as periodic calibrations as recommended by the manufacturer.

v. Pressure Meters - The Permittee shall perform periodic inspections and maintenance (I&M) as recommended by the manufacturer as well as periodic calibrations as recommended by the manufacturer.

vi. The manufacturer recommendations listed for the equipment above shall be made available to the Division of Air Quality upon request.

c. Monitoring Requirements -

i. H_2S Scrubber Requirements -

A. To ensure the proper performance of each H_2S Scrubber system (CD-1 and CD-2), each H_2S Scrubber system shall be equipped with a device to continuously measure the gauge pressure directly upstream and downstream of the Scrubber itself. The device shall be installed in an accessible location and shall be maintained by the Permittee such that it is in proper working order at all times. The pressure drop across the bed shall be recorded electronically for each scrubber (iron sponge) once per day for each day the Gas Upgrading System and CD-1 and/or CD-2 is operating.

B. Monitoring for Breakthrough - Compliance with this permit may be demonstrated by either of the two following options:

I. Differential Pressure - The Permittee shall monitor and electronically record the differential pressure across the

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media bed for each iron sponge once per day for each day the Gas Upgrading System and CD-1 and/or CD-2 is operating. When the differential pressure across the media bed exceeds the allowable range as specified by the manufacturer (30 inches of water), the scrubber media shall be replaced.

II. *Periodic Chemical Analysis – An analyzer shall be installed to determine the concentration of hydrogen sulfide in the outlet stream once every eight (8) hours (up to three times per day, and a minimum of once per day) for each day the Gas Upgrading System is operating. When the outlet concentration of hydrogen sulfide (H_2S) is greater than 100 parts per million (ppm) for two consecutive samples, the scrubber media shall be replaced.*

C. *The biogas shall be analyzed once per quarter to determine the hydrogen sulfide concentration using procedures and analytical methods contained in a testing protocol which has been approved by the Division of Air Quality.*

d. *Recordkeeping Requirements*

i. *The Permittee shall record the flow rates and H_2S concentrations in A and B below once (electronically) per hour of operation. The readings recorded for each day shall be for use in the daily emissions calculation in d.iii. below.*

A. *Flow rates (in standard cubic feet per minute (scfm)) for each Operating Scenario:*

- *Tail gas flow produced by ES-1 Gas Upgrading System*
- *Tail gas flow to each iron sponge vessel (CD-1 and CD-2)*
- *Tail gas flow bypassing the iron sponges to enclosed flare (CD-3) calculated as the difference between the two preceding values*
- *Product gas flow to CD-4 candlestick flare*
- *Biogas flow to CD-4 candlestick flare*
- *Total Biogas flow to the ES-1 GUS (incoming raw material)*
- *Natural gas fuel flow to each flare CD-3 and CD-4 when in operation*

B. *Hydrogen sulfide (H_2S) concentrations, in parts per million, for each Operating Scenario:*

- *Concentration of H_2S in the tail gas exiting the ES-1 GUS*

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- *Concentration of H_2S in the tail gas exiting CD-1 and/or CD-2 based on each scrubber's operational status (when each unit is in operation)*
- *Estimated concentration of H_2S in Biogas bypassing the ES-1 GUS and entering the candlestick flare (CD-4) (using the concentration from the most recent quarterly analysis)*

ii. *The Permittee shall record the concentration of hydrogen sulfide sampled quarterly from the biogas. This value shall be used for calculating sulfur dioxide emissions in 6.d.iii below.*

iii. *The facility-wide actual SO_2 emissions in tons/month for a twelve month rolling total; determined by calculation given the comparative molecular weight of the gas constituents, flow rate of the gas, and operating time for the facility and equipment, given standards for pressure, temperature, and other constant values, as shown below.*

- *<u>ES-1 Scenario 1, Normal Operation, daily emissions</u>:*

Daily SO_2 emissions for tail gas combustion during Normal Operation will be calculated using the following equation (calculated to 3 significant figures):

$$m_{TG} = \frac{60 \times MW_{H2S} \times P}{R \times T} \times (V_{UT} \times PPM_{UT} + V_T + PPM_T) \times \frac{MW_{SO2}}{MW_{H2S}} \times OF \times \frac{HRS}{2{,}000} + 0.05 \times \frac{HRS}{2{,}000}$$

where: *m_{TG} = SO_2 emission rate from tail gas combustion (tons/day)*
60 = conversion factor = 60 min/hr
MW_{H2S} = molecular weight of H_2S (lb/lbmol) = 34.08 lb/lbmol
*P = standard pressure = 14.7 psia R = gas constant = 10.73 (psia*ft^3)/(lbmol*R)*
T = standard temperature = 491.67 R
V_{UT} = measured average daily untreated tail gas volumetric flow rate (scfm)
PPM_{UT} = measured average daily untreated tail gas H_2S concentration (ppm)
V_T = measured average daily treated tail gas volumetric flow rate (scfm)
PPM_T = measured average daily treated tail gas H_2S concentration (ppm)
MW_{SO2} = molecular weight of SO_2 (lb/lbmol) = 64.06 lb/lbmol
OF = H_2S combustion efficiency = 100%[4]
HRS = total number of normal operating hours per day
2,000 = conversion factor = 2,000 lb/ton
0.05 = SO_2 emissions resulting from the combustion of trace sulfur compounds (lb/hr)

Daily SO_2 emissions for natural gas combustion (supplemental fuel) during normal operation will be calculated using the following equation (calculated to 3 significant figures):

$$m_{NG} = \frac{EF \times V_{NG} \times 60 \times HRS}{2{,}000 \times 10^6}$$

[4] Combustion efficiency selected as 100% theoretical maximum, though actual combustion efficiency is likely less (e.g., EPA 40 CFR 60.18 and AP-42 Section 13.5 which states combustion efficiency of 98%).

where: m_{NG} = *SO_2 emission rate from natural gas combustion (tons/day)*

EF = SO_2 emission factor = 0.60 lb/MMscfm[5] natural gas
V_{NG} = measured average daily natural gas volumetric flow rate (scfm)
60 = conversion factor = 60 min/hr
HRS = total number of normal operating hours per day
2,000 = conversion factor = 2,000 lb/ton
10^6 = conversion factor = 10^6 scf/MMscf

Total daily SO_2 emissions during Normal Operation will be calculated using the following equation (calculated to 3 significant figures):

$$m_T = m_{TG} + m_{NG}$$

where: m_T = *total SO_2 emission rate during normal operation (tons/day)*
m_{TG} = *SO_2 emission rate from tail gas combustion during normal operation (tons/day)*
m_{NG} = *SO_2 emission rate from natural gas combustion during normal operation (tons/day)*

- *<u>ES-1 Scenario 2, Off-Spec Operation, daily emissions</u>:*

During Off-Spec Operation, the GUS (ES-1) will process biogas to produce product gas and tail gas. The product gas that does not meet pipeline specifications and therefore cannot be injected into the natural gas pipeline will be combusted in the candlestick flare (CD-4). The tail gas will be treated in the iron sponge system (CD-1 and CD-2) for H_2S removal before being oxidized in the enclosed hybrid flare (CD-3). SO_2 emissions will result from the combustion of tail gas and the combustion of natural gas as supplemental fuel in the enclosed hybrid flare.

SO_2 emissions will also result from the combustion of product gas in the candlestick flare. The product gas flow rate to the candlestick flare will be measured by the Guild PSA system product gas flow meter. The H_2S concentration of the product gas will be measured and recorded using a H_2S Analyzer.

Total daily SO_2 emissions for tail gas combustion and natural gas combustion in the enclosed hybrid flare will be calculated using the equations provided <u>above</u> for Normal Operation. Daily SO_2 emissions for product gas combustion in CD-4 during Off-Spec Operation will be calculated using the following equation (calculated to 3 significant figures):

$$m_{PG} = \frac{60 \times MW_{H2S} \times P}{R \times T} \times (V_{PG} \times PPM_{PG}) \times \frac{MW_{SO2}}{MW_{H2S}} \times OF \times \frac{HRS}{2{,}000} + 0.05 \times \frac{HRS}{2{,}000}$$

where: m_{PG} = *SO_2 emission rate from product gas combustion (tons/day)*
60 = conversion factor = 60 min/hr
MW_{H2S} = *molecular weight of H_2S (lb/lbmol) = 34.08 lb/lbmol*
P = standard pressure = 14.7 psia

[5] Emission factor from AP-42 Section 1.4.

*R = gas constant = 10.73 (psia*ft^3)/(lbmol*R)*
T = standard temperature = 491.67 R
V_{PG} = measured average daily product gas volumetric flow rate (scfm)
PPM_{PG} = measured average daily product gas H_2S concentration (ppm)
MW_{SO2} = molecular weight of SO_2 (lb/lbmol) = 64.06 lb/lbmol
OF = H_2S combustion efficiency = 100%
HRS = total number of off-spec operating hours per day
2,000 = conversion factor = 2,000 lb/ton
0.05 = SO_2 emissions resulting from the combustion of trace sulfur compounds (lb/hr)

Total daily SO_2 emissions during Off-Spec Operation will be calculated using the following equation (calculated to 3 significant figures):

$$m_T = m_{TG} + m_{NG} + m_{PG}$$

where: *m_T = total SO_2 emission rate during Off-Spec Operation (tons/day)*
m_{TG} = SO_2 emission rate from tail gas combustion during Off-Spec Operation (tons/day)
m_{NG} = SO_2 emission rate from natural gas combustion during Off-Spec Operation (tons/day) from both flares (CD-3 and CD-4) as applicable
m_{PG} = SO_2 emission rate from product gas combustion during Off-Spec Operation (tons/day)

- *<u>ES-1 Scenario 3, By-Pass Operation, daily emissions</u>:*

During Bypass Operation, biogas entering the BF Grady Rd facility will bypass the GUS (ES-1) and be directed to the candlestick flare (CD-4) for combustion. The biogas flow rate to the candlestick flare will be recorded by the BF Grady Rd facility master control system.

Daily SO_2 emissions from biogas combustion during Bypass Operation will be calculated using the following equation (calculated to 3 significant figures):

$$m_{BG} = \frac{60 \times MW_{H2S} \times P}{R \times T} \times (V_{BG} \times PPM_{BG}) \times \frac{MW_{SO2}}{MW_{H2S}} \times OF \times \frac{HRS}{2{,}000} + 0.05 \times \frac{HRS}{2{,}000}$$

where: *m_{BG} = SO_2 emission rate from biogas combustion during bypass operation (tons/day)*
60 = conversion factor = 60 min/hr
MW_{H2S} = molecular weight of H_2S (lb/lbmol) = 34.08 lb/lbmol
P = standard pressure = 14.7 psia
*R = gas constant = 10.73 (psia*ft^3)/(lbmol*R)*
T = standard temperature = 491.67 R
V_{BG} = measured average daily biogas volumetric flow rate (scfm)
PPM_{BG} = most recent measured biogas H_2S concentration (ppm)
MW_{SO2} = molecular weight of SO_2 (lb/lbmol) = 64.06 lb/lbmol
OF = H_2S combustion efficiency = 100%
HRS = total number of bypass operating hours per day

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2,000 = conversion factor = 2,000 lb/ton
0.05 = SO_2 emissions resulting from the combustion of trace sulfur compounds (lb/hr)

Total daily SO_2 emissions during Bypass Operation will be calculated using the following equation (calculated to 3 significant figures):

$$m_T = m_{BG} + m_{NG}$$

where: *m_T = total SO_2 emission rate during Bypass Operation (tons/day)*
m_{BG} = SO_2 emission rate from biogas combustion during Bypass Operation (tons/day)
m_{NG} = SO_2 emission rate from natural gas combustion during Bypass Operation (tons/day) from candlestick flare (CD-4)

iv. *After 6 months of operation, based on demonstrated compliance with the permit, if the hourly readings are consistent and stable, the permittee may request a permit modification to change to less frequent monitoring.*

e. *<u>Reporting Requirement</u>*

i. *The Permittee shall submit the monthly and 12 month rolling total actual SO_2 emissions to the Regional Supervisor of NC DAQ – Wilmington Regional Office within thirty (30) days after each calendar year (no later than January 30th of each year).*

ii. *Calculation of the consecutive 12-month periods shall begin upon start-up of the facility (biogas flowing to the Align RNG facility).*

The following condition (PSD avoidance) will be added to the permit out of an abundance of caution; this is routine for some synthetic minor facilities. The synthetic minor limitation (and reporting) will provide the same tracking mechanism to demonstrate compliance with this rule. This would only be an issue in the case of actual emissions of SO_2 being > 250 tons/yr.

7. *<u>LIMITATION TO AVOID 15A NCAC 2D .0530 "PREVENTION OF SIGNIFICANT DETERIORATION"</u> - In accordance with 15A NCAC 2Q .0317, to comply with this permit and avoid the applicability of 15A NCAC 2D .0530 "Prevention of Significant Deterioration," as requested by the Permittee, emissions shall be limited as follows:*

Affected Source(s)	***Pollutant***	***Emission Limit (Tons Per Consecutive 12-month Period)***
Facility Wide	*SO_2*	*250*

a. *<u>Operations Restrictions</u> - To ensure emissions do not exceed the limitations above, the following restrictions shall apply:*

i. *For monitoring of SO_2 actual emissions for this PSD avoidance condition (to remain below 250 ton/yr), please see the synthetic minor condition above for monitoring, recordkeeping, and reporting language. The same*

synthetic minor condition language shall suffice for this PSD avoidance condition.

b. *Recordkeeping Requirements - The Permittee shall keep each monthly record on file for a minimum of three years. The following requirements for recordkeeping shall also apply:*

   i. *For recordkeeping of SO_2 actual emissions for this PSD avoidance condition, please see the synthetic minor condition above for monitoring, recordkeeping, and reporting language. The same synthetic minor condition language shall suffice for this PSD avoidance condition.*

c. *Reporting Requirements - Within 30 days after each calendar year (no later than January 30th of each year), regardless of the actual emissions, the following shall be reported to the Regional Supervisor, DAQ:*

   i. *For reporting of SO_2 actual emissions for this PSD avoidance condition, please see the synthetic minor condition above for monitoring, recordkeeping, and reporting language. The same synthetic minor condition language shall suffice for this PSD avoidance condition.*

d. *Calculation of the consecutive 12-month periods shall begin upon start-up of the facility (biogas flowing to the Align RNG facility).*

7. Applicability of NSPS, NESHAPS, PSD, and 112(r)

Not Applicable for NSPS, PSD, and 112(r). This is a minor source for Part 70 (Title V) and PSD permitting.
No MACT or GACT standards were found to be applicable to this biogas / renewable natural gas (RNG) source.

NESHAP ZZZZ (RICE engines, Reciprocating Internal Combustion Engines) does not apply to this facility. There are no emergency back-up generators present.

8. NC Air Toxics

Not Applicable – no NC air toxics were shown in the application to be above the 2Q .0711 de minimus value. The hydrogen sulfide toxic TPER per 2Q .0711 (b) for vertical and unobstructed stacks is 5.1 lb/day. The applicant stated (and the DAQ verified) that the highest scenario emission rate for hydrogen sulfide was 4.79 lb/day from scenario 3. Even though the H_2S actual emission rate is below the 2Q .0711 toxic permitting exemption rate (TPER) value, DAQ has included the 2Q.0711 TPER condition in the air permit to make clear that prior to exceeding any TPER, the Permittee shall be required to seek a permit modification and demonstrate compliance with the air toxics rules The calculation method for this actual emission rate (provided by the applicant) is as follows:

The potential H_2S Emission rate with controls/limits for ES-1 during normal operations (Scenario #1) is 0.11 lb/hr, based on the max flow rate of 1,200 SCFM and the upper

expectation of H_2S in the biogas of 3,500 ppm. Given the operation in Scenario #1, this yields an emission rate for H_2S of 2.66 lb/day, as follows:

0.11 lb/hr X 24 hr/day = 2.64 lb/day (the applicant listed 2.66 lb/day, due to additional significant digits in the calculation). This is based on the maximum flow rate for the facility at a conservative concentration of H_2S and is almost half the toxics limit. Therefore, Scenario #1 does not prompt toxics modeling.

The H_2S emission rate for Scenario #2, product gas combustion in the candlestick flare, is equal to the emission rate for Scenario #1, normal operation. This is based on the maximum flow rate of biogas of 1,200 scfm and the upper expectation of H_2S in the biogas of 3,500 ppm. During Scenario #2, the iron sponge system will still be utilized for H_2S removal from the tail gas prior to it being oxidized in the hybrid flare. Product gas combustion in the candlestick flare will not increase H_2S emissions because the H_2S contained in the biogas is removed from the product gas in the gas upgrading system and leaves the system with the tail gas. Therefore, the total quantity of H_2S is accounted for in the tail gas in the emissions calculations. Similar to Scenario #1, this yields an emission rate for H_2S of 2.66 lb/day, as follows: 0.11 lb/hr X 24 hr/day = 2.64 lb/day. Since the estimated emission of 2.64 lb/day is below the 5.1 lb/day Toxic Permitting Exemption Rate in 15A NCAC 2Q .0711, additional analysis is not required

Similarly, the emission rate for Scenario #3 uses a potential H_2S emission rate of 0.479 lb/hr, based on the biogas being combusted in the candlestick flare (CD-4) at the same max operating flow of 1,200 SCFM and H_2S concentration of 3,500 ppm:

0.479 lb/hr X 10 hr/day = 4.79 lb/day. 10 hrs per day was selected as a limit of operations for full flow (actually 10.65 hours per day).

TOXIC AIR POLLUTANT EMISSIONS LIMITATION REQUIREMENT - Pursuant to 15A NCAC 2Q .0711 "Emission Rates Requiring a Permit," for each of the below listed toxic air pollutants (TAPs), the Permittee has made a demonstration that facility-wide actual emissions, where all emission release points are unobstructed and vertically oriented, do not exceed the Toxic Permit Emission Rates (TPERs) listed in 15A NCAC 2Q .0711(b). The facility shall be operated and maintained in such a manner that emissions of any listed TAPs from the facility, including fugitive emissions, will not exceed TPERs listed in 15A NCAC 2Q .0711(b).

a. *A permit to emit any of the below listed TAPs shall be required for this facility if actual emissions from all sources will become greater than the corresponding TPERs.*

b. *Except when tail gas is being recirculated through the system in a closed loop to build pressure during start-up, whenever tail gas is exiting the GUS, CD-3 is required to be operational. Whenever biogas is flowing to the facility and by-passing the GUS, or when off-specification pipeline gas is not being injected into the pipeline, CD-4 is required to be operational.*

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c. *Each flare (CD-3 and CD-4) shall be equipped with a heat-sensing device, such as an ultraviolet beam sensor or a thermocouple, installed in proximity of the pilot light, to confirm the presence of a flame. The pilot flame must be present at all times while biogas, or tail gas, or off-specification product gas is routed to the flares to assure compliance. The heat sensing device shall send a distinct parameter value to indicate that the pilot flame is on, and a separate, distinct parameter value to indicate that the pilot flame is off.*

d. *PRIOR to exceeding any of these listed TPERs, the Permittee shall be responsible for obtaining a permit to emit TAPs and for demonstrating compliance with the requirements of 15A NCAC 2D .1100 "Control of Toxic Air Pollutants".*

e. *In accordance with the approved application, the Permittee shall maintain records of operational information demonstrating that the TAP emissions do not exceed the TPERs as listed below:*

Pollutant	***Carcinogens (lb/yr)***	***Chronic Toxicants (lb/day)***	***Acute Systemic Toxicants (lb/hr)***	***Acute Irritants (lb/hr)***
Hydrogen sulfide (7783-06-4)		*5.1*		

f. *In order to demonstrate compliance the emission limit above, the permittee shall calculate the daily facility wide emission rate (lbs/day) of hydrogen sulfide when CD-4 (candlestick flare) combusts biogas for more than 10 hours in a day.*

g. *Within 5 business days of exceeding 10 hours per day of combusting biogas in CD-4, the results of the calculation in f. above shall be reported to the Division of Air Quality.*

9. Public Comment Period May 16, 2020 to June 15, 2020

This project (draft permit review and the draft permit) was provided an initial 30-day public comment period via two different newspapers; the Sampson Independent (posted on Saturday May 16, 2020) and the Duplin Times (posted on Thursday May 21, 2020). Copies of each actual newspaper are retained in the Wilmington Regional Office.
All relevant comments and responses will be summarized and addressed in the Hearing Officers' report issued in connection with any final action.

10. Changes made to the draft permit since the May 16, 2020 – June 16, 2020 comment period.

Changes made to this permit since the May 16, 2020 – June 16, 2020 comment period include the following:

1. Condition A.3. 2D .0516: minor clarifications of language and explanation of tail gas flow and concentration in A.3.a. Also, alternative language for A.3.b. was provided by

the applicant which was allowed and the current final draft permit does contain this proposed language.

2. Condition A.6.d. 2Q .0315: minor clarifications of language dealing with frequency of monitoring in the heading portion of paragraph d. Also, language dealing with monthly rolling SO_2 calculations were addressed and allowed as is shown in the current final draft permit

3. Condition A.6.d. 2Q .0315 for SO_2 emission from the CD-4 candlestick flare in Scenario #3 Bypass Operation, the applicant commented that the supplemental fuel emissions should be calculated separately, which will be allowed. This is now in the final draft permit.

4. Former Condition A.6.i.C. 2Q .0315: had the language ….. "the H_2S Analyzer will be housed in the facility's product gas analyzer building." This language has been omitted and struck from the final permit.

5. At Specific Condition A.3.(a); Changed the monitoring frequency from once every 8 hours to once every hour.

6. At Specific Condition A.3.(b): Added a term (0.05 lb/hr SO_2 emissions) due to the combustion of trace sulfur compounds in the flare.

7. At Specific Condition A.3.(b); Changed the combustion efficiency of H_2S to SO_2 emissions in the flare(s) from 98% to 100%.

8. At Specific Condition A.6.(b)(vi); Added this line item as paragraph (vi); The manufacturer recommendations listed for the equipment above shall be made available to the Division of Air Quality upon request.

9. At Specific Condition A.6.(c)(i)C.; Added this line item as paragraph (C); The biogas shall be analyzed once per quarter to determine the hydrogen sulfide concentration using procedures and analytical methods contained in a testing protocol which has been approved by the Division of Air Quality.

10. At Specific Condition A.6.(d)(ii); Added this line item as paragraph (ii); The Permittee shall record the concentration of hydrogen sulfide sampled quarterly from the biogas. This value shall be used for calculating sulfur dioxide emissions in 6.d.iii below.

11. Throughout the permit, all monthly calculations and recordkeeping of SO_2 emissions have been changed to daily.

12. At Specific Condition A.3.(c) for 2D .0516; added the following language,

    <u>Reporting</u>: The Permittee shall notify the Regional Supervisor within five (5) business day if the daily load to CD-3 results in an exceedance of the 2.3 lbs SO_2/MMBtu limitation. The data is not required to be reported to the Regional Office but must be maintained on site and immediately available for review by DAQ personnel.

11. Compliance History

The facility has not been inspected yet by the WiRO staff. This will happen after being assigned to a DAQ inspector in this region upon permit issuance; full compliance status is expected.

12. Recommend Issuance of Air Permit No. 10644R00.

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