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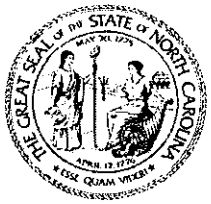

NORTH CAROLINA
Environmental Quality

January 6, 2021

Mr. Kraig Westerbeek
V.P. Environmental and Manufacturing
Align RNG, LLC
PO Box 856
Warsaw, NC 28398

Subject: Air Permit No. 10644R00
Align RNG, LLC - BF Grady Road
Turkey, Duplin County, North Carolina
Permit Class: Synthetic Minor
Facility ID# 3100179

Dear Mr. Westerbeek:

In accordance with your completed application received February 27, 2020, we are forwarding herewith Permit No. 10644R00 to Align RNG, LLC for project BF Grady Road, Turkey, Duplin County, North Carolina for the construction and operation of air emissions sources or air cleaning devices and appurtenances. Please note the records retention requirements are contained in General Condition 2 of the General Conditions and Limitations.

If any parts, requirements, or limitations contained in this permit are unacceptable to you, you have the right to request a formal adjudicatory hearing within 30 days following receipt of this permit, identifying the specific issues to be contested. Such a request will stay the effectiveness of the entire permit. This hearing request must be in the form of a written petition, conforming to G.S. 150B-23 of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, NC 27699-6714. The form for requesting a formal adjudicatory hearing may be obtained upon request from the Office of Administrative Hearings. Unless a request for a hearing is made pursuant to G.S. 150B-23, this air permit shall be final and binding.

You may request modification of your air permit through informal means pursuant to G.S. 150B-22. This request must be submitted in writing to the Director and must identify the specific provisions or issues for which the modification is sought. Please note that the permit will become final and binding regardless of a request for informal modification unless a request for a hearing is also made under G.S. 150B-23.

Unless exempted by a condition of this permit or the regulations, construction of new air pollution sources or air cleaning devices, or modifications to the sources or air cleaning

devices described in this permit must be covered under a permit issued by the Division of Air Quality prior to construction. Failure to do so is a violation of G.S. 143-215.108 and may subject the Permittee to civil or criminal penalties as described in G.S. 143-215.114A and 143-215.114B.

This permit shall be effective from January 6, 2021 until December 31, 2028, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

For PSD increment tracking purposes, SO_2 emissions from this modification are increased by 10 pounds per hour and NOx emissions from this modification are increased by 1 pounds per hour.

***This permit is the result of a request for a new application for an air quality permit; all emission sources and control devices are new*. The Permittee is responsible for carefully reading the entire permit and evaluating the requirements of each permit stipulation. The Permittee shall comply with all terms, conditions, requirements, limitations and restrictions set forth in this permit. Noncompliance with any permit condition is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.**

Should you have any questions concerning this matter, please contact Dean Carroll at 910-796-7242.

Sincerely,

Brad Newland, Wilmington Regional Supervisor
Division of Air Quality, NC DEQ

Enclosures

c: Wilmington Regional Office
Connie Horne, Cover letter only
WiRO Permit Coordinator
Ibeam Doc Mod ___

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION OF AIR QUALITY

AIR PERMIT NO. 10644R00

Issue Date: January 6, 2021 | Effective Date: January 6, 2021
Expiration Date: December 31, 2028 | Replaces Permit: (new)

To construct and operate air emission source(s) and/or air cleaning device(s), and for the discharge of the associated air contaminants into the atmosphere in accordance with the provisions of Article 21B of Chapter 143, General Statutes of North Carolina (NCGS) as amended, and other applicable Laws, Rules and Regulations,

Align RNG, LLC
(project BF Grady Road)
2940 NC Highway 24 west
Turkey, Duplin County, North Carolina
Permit Class: Synthetic Minor
Facility ID# 3100179

(the Permittee) is hereby authorized to construct and operate the air emissions sources and/or air cleaning devices and appurtenances described below:

Emission Source ID	Emission Source Description	Control System ID	Control System Description
ES-1 GUS Scenario 1 Normal Operation (Including Start-Up Situations) OS-1	one Gas Upgrading System (ES-1 GUS) consisting of a pressure swing adsorption (PSA) media system with a maximum rated capacity of 1,200 scfm. In Normal Operation, the product gas is delivered to the natural gas pipeline, and the remaining biogas constituents (tail gas) are directed to CD-1, CD-2, and CD-3.	CD-1 Scrubber (CD-1 and CD-2 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 Scrubber (CD-1 and CD-2 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	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. (this flare may also combust (bypass) tail gas directly from the ES-1 GUS.)
ES-1 GUS Scenario 2 Off-Specification Production OS-2	one Gas Upgrading System (ES-1 GUS) as described above; In Off-Specification Production operation, the product gas is directed to CD-4. The remaining biogas constituents (tail gas) are	CD-1 Scrubber (CD-1 and CD-2 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 Scrubber (CD-1 and CD-2 are in parallel and may operate simultaneously)	one iron sponge (scrubber) system vessel with fixed bed media (iron oxide) for hydrogen sulfide removal

Emission Source ID	Emission Source Description	Control System ID	Control System Description
	directed to CD-1, CD-2, and CD-3. And/or CD-4	CD-3 Enclosed Hybrid Flare	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
		CD-4 Candlestick Flare	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
ES-1 GUS Scenario 3 By-Pass Biogas OS-3	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.	CD-4 Candlestick Flare	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

in accordance with the completed application 3100179.19A received February 27, 2020 including any plans, specifications, previous applications, and other supporting data, all of which are filed with the Department of Environmental Quality, Division of Air Quality (DAQ) and are incorporated as part of this permit.

This permit is subject to the following specified conditions and limitations including any TESTING, REPORTING, OR MONITORING REQUIREMENTS:

A. SPECIFIC CONDITIONS AND LIMITATIONS

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 02D .0202, 02D .0516, 02D .0521, 02D .0535, 02D .0540, 02D .1806, 02Q .0315, 02Q .0317 (02D .0530 PSD avoidance), and 02Q .0711 (TPER).

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 02Q .0304(d) and (f). Pursuant to 15A NCAC 02Q .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 02D .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 **2027** calendar year.

3. In accordance with G.S. 143-215.108(c)(1) - the maximum biogas feedstock flow into the Gas Upgrading System shall be no greater than 1,200 standard cubic feet per minute (scfm).

4. SULFUR DIOXIDE CONTROL REQUIREMENT - As required by 15A NCAC 02D .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 meet 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 sponges 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 (in lb/MMBtu) for the enclosed hybrid flare (CD-3). Except for periods covered under 15A NCAC 2D .0535, 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):

      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) divided by 10^6 conversion factor
Q_T = measured average daily treated tail gas volumetric flow rate (scfm)
PPM_T = measured average daily treated tail gas H_2S concentration (ppm) divided by 10^6 conversion factor
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 from trace sulfur compounds (lb/hr) unless and until the facility can demonstrate, through sampling, that an alternative value is more representative.

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)

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 days if the daily emissions exceeds 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.

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[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.

5. VISIBLE EMISSIONS CONTROL REQUIREMENT - As required by 15A NCAC 2D .0521 "Control of Visible Emissions," visible emissions from the emission sources, manufactured after July 1, 1971, shall not be more than 20 percent opacity when averaged over a six-minute period, except that six-minute periods averaging not more than 87 percent opacity may occur not more than once in any hour nor more than four times in any 24-hour period. However, sources which must comply with a visible emissions standard in 15A NCAC 2D .0524 "New Source Performance Standards" or .1110 "National Emission Standards for Hazardous Air Pollutants" shall meet that standard instead of the 2D .0521 visible emissions standard.

6. NOTIFICATION REQUIREMENT - As required by 15A NCAC 02D .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.

7. FUGITIVE DUST CONTROL REQUIREMENT - As required by 15A NCAC 02D .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).

8. CONTROL AND PROHIBITION OF ODOROUS EMISSIONS - As required by 15A NCAC 2D .1806 "Control and Prohibition of Odorous Emissions" the Permittee shall not operate the facility without implementing management practices or installing and operating odor control equipment sufficient to prevent odorous emissions from the facility from causing or contributing to objectionable odors beyond the facility's boundary.

9. LIMITATION TO AVOID 15A NCAC 02Q .0501 - Pursuant to 15A NCAC 02Q .0315 "Synthetic Minor Facilities," to avoid the applicability of 15A NCAC 02Q .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 tons/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.

vii. Within 15 days of the issuance of all purchase contracts signed by the Permittee with air pollution control equipment vendors and parametric monitoring and data recording equipment vendors, the Permittee shall provide written notification of the last signed contract.

viii. A written inspection, maintenance, and calibration plan shall be submitted to the DAQ for approval within 30 days of the issuance of the final purchase contracts by the facility to vendors of any air pollution control equipment, parameter (parametric) monitors, and data recording equipment. Once approved by the DAQ, a copy of the written plan shall be kept onsite at all times and made available to DAQ personnel 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 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 (per manufacturers recommendation), the scrubber media shall be replaced.

C. The H_2S concentration of the biogas feedstock shall be analyzed once per month beginning with the initial operation of the facility. After 12 months of the monthly concentrations, the facility may submit an Air Quality Permit application for less frequent analysis of the biogas feedstock based on the analysis of the results of the monthly H_2S concentration measurements.

d. Recordkeeping Requirements

i. The Permittee shall record the flow rates and H_2S concentrations in A and B below once 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
- 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
- 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)
- Representative 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 monthly analysis)

ii. The Permittee shall record the concentration of hydrogen sulfide sampled monthly 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 ratio of molecular weights 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.

- ES-1 Scenario 1, Normal Operation, daily emissions:

Daily SO_2 emissions for tail gas combustion during Normal Operation will be calculated using the following equation (calculated to 2 significant figures after the decimal point):

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

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} = calculated average daily untreated tail gas volumetric flow rate (scfm)
PPM_{UT} = measured average daily untreated tail gas H_2S concentration (ppm) divided by 10^6
V_T = measured average daily treated tail gas volumetric flow rate (scfm)
PPM_T = measured average daily treated tail gas H_2S concentration (ppm) divided by 10^6
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 from trace sulfur compounds (lb/hr) unless and until the facility can demonstrate, through sampling, that an alternative value is more representative.

Daily SO_2 emissions for natural gas combustion (supplemental fuel) during normal operation will be calculated using the following equation (calculated to 2 significant figures after the decimal point):

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

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

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

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 2 significant figures after the decimal point):

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

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)

- ES-1 Scenario 2, Off-Specification Operation, daily emissions:

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 combusted 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 product gas flow meter. The H_2S concentration of the product gas will be measured and recorded using an 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 prior equations provided for Normal Operation. Daily SO_2 emissions for product gas combustion in CD-4 during Off-Specification Operation will be calculated using the following equation (calculated to 2 significant figures after the decimal point):

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

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
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) divided by 10^6
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 from trace sulfur compounds (lb/hr) unless and until the facility can demonstrate, through sampling, that an alternative value is more representative.

Total daily SO_2 emissions during Off-Specification Operation will be calculated using the following equation (calculated to 2 significant figures after the decimal point):

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

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)

- ES-1 Scenario 3, By-Pass Operation, daily emissions:

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 2 significant figures after the decimal point):

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

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) divided by 10^6
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
2,000 = conversion factor = 2,000 lb/ton
0.05 = SO_2 emissions from trace sulfur compounds (lb/hr) unless and until the facility can demonstrate, through sampling, that an alternative value is more representative.

Total daily SO_2 emissions during Bypass Operation will be calculated using the following equation (calculated to 2 significant figures after the decimal point):

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

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. Reporting Requirement

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).

10. LIMITATION TO AVOID 15A NCAC 02D .0530 "PREVENTION OF SIGNIFICANT DETERIORATION" - In accordance with 15A NCAC 02Q .0317, to comply with this permit and avoid the applicability of 15A NCAC 02D .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. Operations Restrictions - 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.

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

11. 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.

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. A day is defined as 12 midnight to 12 midnight. An hour is defined as each hour of the day. When an operating scenario changes during an hour, any additional parameter measurements required to calculate emissions under the new operating scenario are required to be made during the remainder of the hour. Emissions from each operating scenario during a single hour shall then be ratioed according to the time each operating scenario occurred in an hour. Those ratioed values shall then be added together to represent emissions of hydrogen sulfide for that hour.

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.

The following equations shall be used to calculate the daily H_2S emission rate (lb/day):

Operating Scenario 1 –

$$m_{\text{hr H2S OS1}} = \left[\frac{(60)(MW_{\text{H2S}})(P)}{(R)(T)}\right] * \left[(V_{\text{HUT}})\left(\frac{PPM_{\text{HUT}}}{10^6}\right) + (V_{\text{HT}})\left(\frac{PPM_{\text{HT}}}{10^6}\right)\right] * 0.02$$

Operating Scenario 2 –

$$m_{\text{hr H2S OS2}} = \left[\frac{(60)(MW_{\text{H2S}})(P)}{(R)(T)}\right] * \left[(V_{\text{HUT}})\left(\frac{PPM_{\text{HUT}}}{10^6}\right) + (V_{\text{HT}})\left(\frac{PPM_{\text{HT}}}{10^6}\right) + (V_{\text{HPG}})\left(\frac{PPM_{\text{HPG}}}{10^6}\right)\right] * 0.02$$

Operating Scenario 3 –

$$m_{\text{hr H2S OS3}} = \left[\frac{(60)(MW_{\text{H2S}})(P)}{(R)(T)}\right] * \left[(V_{\text{HBG}})\left(\frac{PPM_{\text{MBG}}}{10^6}\right)\right] * 0.02$$

Total H_2S Emissions per day (lb/day):

$M_{\text{hr H2S}}$ = H_2S emission rate from facility from OS-1, OS-2, and OS-3 per hour
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_{HUT} = hourly calculated untreated tail gas volumetric flow rate (scfm)
PPM_{HUT} = measured hourly untreated tail gas H_2S concentration (ppm)
V_{HT} = measured hourly treated tail gas volumetric flow rate (scfm)
PPM_{HT} = measured hourly treated tail gas H_2S concentration (ppm)
0.02 = assuming 98% conversion of H_2S to SO_2
V_{HPG} = measured hourly product gas volumetric flow rate (scfm)
PPM_{HPG} = measured hourly product gas H_2S concentration (ppm)
V_{HBG} = measured hourly biogas volumetric flow rate (scfm)
PPM_{MBG} = measured hourly biogas H_2S concentration (ppm)

$$m_{\text{daily H2S}} = \sum_{i=1}^{24} m_{\text{hr H2S OS1i}} + m_{\text{hr H2S OS2i}} + m_{\text{hr H2S OS3i}}$$

B. GENERAL CONDITIONS AND LIMITATIONS

1. In accordance with G.S. 143-215.108(c)(1), TWO COPIES OF ALL DOCUMENTS, REPORTS, TEST DATA, MONITORING DATA, NOTIFICATIONS, REQUESTS FOR RENEWAL, AND ANY OTHER INFORMATION REQUIRED BY THIS PERMIT shall be submitted to the:

   Regional Supervisor
   North Carolina Division of Air Quality
   Wilmington Regional Office
   127 Cardinal Drive Extension
   Wilmington, NC 28405 910-796-7215

   For identification purposes, each submittal should include the facility name as listed on the permit, the facility identification number, and the permit number.

2. RECORDS RETENTION REQUIREMENT - In accordance with 15A NCAC 2D .0605, any records required by the conditions of this permit shall be kept on site and made available to DAQ personnel for inspection upon request. These records shall be maintained in a form suitable and readily available for expeditious inspection and review. These records must be kept on site for a minimum of 2 years, unless another time period is otherwise specified.

3. ANNUAL FEE PAYMENT - Pursuant to 15A NCAC 2Q .0203(a), the Permittee shall pay the annual permit fee within 30 days of being billed by the DAQ. Failure to pay the fee in a timely manner will cause the DAQ to initiate action to revoke the permit.

4. EQUIPMENT RELOCATION - In accordance with 15A NCAC 2Q .0301, a new air permit shall be obtained by the Permittee prior to establishing, building, erecting, using, or operating the emission sources or air cleaning equipment at a site or location not specified in this permit.

5. REPORTING REQUIREMENT - In accordance with 15A NCAC 2Q .0309, any of the following that would result in previously unpermitted, new, or increased emissions must be reported to the Regional Supervisor, DAQ:

   a. changes in the information submitted in the application regarding facility emissions;

   b. changes that modify equipment or processes of existing permitted facilities; or

   c. changes in the quantity or quality of materials processed.

If appropriate, modifications to the permit may then be made by the DAQ to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause a violation of the emission limitations specified herein.

6. In accordance with 15A NCAC 2Q .0309, this permit is subject to revocation or modification by the DAQ upon a determination that information contained in the application or presented in the support thereof is incorrect, conditions under which this permit was granted have changed, or violations of conditions contained in this permit have occurred. In accordance with G.S. 143-215.108(c)(1), the facility shall be properly operated and maintained at all times in a manner that will effectuate an overall reduction in air pollution. Unless otherwise specified by this permit, no emission source may be operated without the concurrent operation of its associated air cleaning device(s) and appurtenances.

7. In accordance with G.S. 143-215.108(c)(1), this permit is nontransferable by the Permittee. Future owners and operators must obtain a new air permit from the DAQ.

8. In accordance with G.S. 143-215.108(c)(1), this issuance of this permit in no way absolves the Permittee of liability for any potential civil penalties which may be assessed for violations of State law which have occurred prior to the effective date of this permit.

9. In accordance with G.S. 143-215.108(c)(1), this permit does not relieve the Permittee of the responsibility of complying with all applicable requirements of any Federal, State, or Local water quality or land quality control authority.

10. In accordance with 15A NCAC 2D .0605, reports on the operation and maintenance of the facility shall be submitted by the Permittee to the Regional Supervisor, DAQ at such intervals and in such form and detail as may be required by the DAQ. Information required in such reports may include, but is not limited to, process weight rates, firing rates, hours of operation, and preventive maintenance schedules.

11. A violation of any term or condition of this permit shall subject the Permittee to enforcement pursuant to G.S. 143-215.114A, 143-215.114B, and 143-215.114C, including assessment of civil and/or criminal penalties.

12. Pursuant to North Carolina General Statute 143-215.3(a)(2), no person shall refuse entry or access to any authorized representative of the DAQ who requests entry or access for purposes of inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper, or interfere with any such representative while in the process of carrying out his official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

13. In accordance with G.S. 143-215.108(c)(1), this permit does not relieve the Permittee of the responsibility of complying with any applicable Federal, State, or Local requirements governing the handling, disposal, or incineration of hazardous, solid, or medical wastes, including the Resource Conservation and Recovery Act (RCRA) administered by the Division of Waste Management.

14. PERMIT RETENTION REQUIREMENT - In accordance with 15A NCAC 2Q .0110, the Permittee shall retain a current copy of the air permit at the site. The Permittee must make

available to personnel of the DAQ, upon request, the current copy of the air permit for the site.

15. CLEAN AIR ACT SECTION 112(r) REQUIREMENTS - Pursuant to 15A NCAC 2D .2100 "Risk Management Program," if the Permittee is required to develop and register a risk management plan pursuant to Section 112(r) of the Federal Clean Air Act, then the Permittee is required to register this plan with the USEPA in accordance with 40 CFR Part 68.

16. PREVENTION OF ACCIDENTAL RELEASES - GENERAL DUTY - Pursuant to Title I Part A Section 112(r)(1) of the Clean Air Act "Hazardous Air Pollutants - Prevention of Accidental Releases - Purpose and General Duty," although a risk management plan may not be required, if the Permittee produces, processes, handles, or stores any amount of a listed hazardous substance, the Permittee has a general duty to take such steps as are necessary to prevent the accidental release of such substance and to minimize the consequences of any release. **This condition is federally-enforceable only.**

17. GENERAL EMISSIONS TESTING AND REPORTING REQUIREMENTS - If emissions testing is required by this permit, or the DAQ, or if the Permittee submits emissions testing to the DAQ in support of a permit application or to demonstrate compliance, the Permittee shall perform such testing in accordance with 15A NCAC 2D .2600 and follow all DAQ procedures including protocol approval, regional notification, report submittal, and test results approval. Additionally, in accordance with 15A NCAC 2D .0605, the Permittee shall follow the procedures for obtaining any required audit sample and reporting those results.

Permit issued this the 6th day of January, 2021.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Brad Newland
Wilmington Regional Supervisor
By Authority of the Environmental Management Commission