

NARRATIVE

TO: Cynthia Dorrough

FROM: Bradley Prinsen

DATE: July 8, 2024

Facility Name: **GreenGasUSA RNG Facility at Darling Dublin**
AIRS No.: 175-00079
Location: East Dublin, GA (Laurens County)
Application #: 29349
Date of Application: June 26, 2024

Background Information

GreenGas USA proposes to build a RNG facility at an existing campus owned by Darling Ingredients Incorporated. The current plant, located in Laurens County, is designated as attainment for all classifiable criteria pollutants. The Darling facility is currently a synthetic minor source with respect to Title V regulations. It operates under Permit No. 2077-175-0042-S-05-0 issued on October 24, 2019, Permit Amendment 2077-175-0042-S-05-1 issued on December 13 2022, and Permit Amendment 2077-175-0042-S-05-2 issued on September 28, 2023, respectively. The new RNG facility will operate as a true minor source with respect to Title V.

Purpose of Application

Darling Ingredients Inc. submitted Permit Application # 29349, dated June 26, 2024, for the construction and operation of a renewable natural gas treatment and collection system located at the existing Darling rendering plant. The proposed RNG facility will include the installation of gas compression, molecular gate PSA (pressure swing absorption), and a flare to control the PSA tail gas during operations. This gas collection system will allow for the raw biogas generated from the anaerobic digestors to be captured and collected for treatment at the molecular gate PSA. The PSA tail gas will be combusted at the flare, and the product gas will be delivered to a natural gas pipeline for sale. A public advisory will be needed due to the construction of a new emissions unit. The public advisory period ended August 9, 2024.

Updated Equipment List

Emission Units			Associated Control Devices	
Source Code	Description	Installation Date	Source Code	Description
RNG1	Recovered Natural Gas Process	--	FL01	Flare

*proposed within current application

Emissions Summary

Potential site-wide emissions are presented in the table below. The proposed RNG facility (Source Code RNG1) located at the Darling Plant will consist of single feed gas compression, a molecular gate PSA unit, and a flare to control emissions during operations.

Feed Gas Compression

During the Darling Plant's rendering process, untreated gas is fed into a lagoon supplied with anaerobic digestors. During digestion, microorganisms decompose organic matter in the absence of oxygen, which produces large amounts of methane gas. The anaerobic digestors at the plant contain a gas collection system under the digester cover, which allows for the raw biogas generated from the digestors to be captured, collected, and sent to a gas treatment system.

The raw gas contains approximately 67% (CH₄), 28% CO₂, 5% water vapor and trace amounts of H₂S (hydrogen sulfide). This gas will be sent to the GreenGas treatment system located adjacent to the wastewater lagoon onsite. GreenGas will compress the raw gas, cool the gas in an air cooler, and remove condensate.

Molecular Gate PSA

The new RNG facility will use a Molecular Gate PSA to remove CO₂, H₂S, VOCs, and H₂O in a single step. PSA technology works through a chemical separation process in which a mixture of gases is passed through a bed of adsorbent media at high pressure. Under pressure, the specific gasses will be selectively adsorbed on to the surface and pores of the adsorbent media. The gasses are removed from the media by "swinging" the media to low pressure.

Methane, N₂ and O₂ pass through the molecular gate as "product gas". Vacuum compression is used to regenerate the PSA media and remove contaminants (CO, H₂S, and H₂O), which are known as PSA "tail gas". Tail gas will be sent to the flare in the RNG facility and will be combusted to minimize H₂S emissions.

Flare (Source Code FL01)

The GreenGas facility intends to install a flare as a control device to reduce emissions of H₂S and control odor generated by tail gas from the Molecular Gate PSA. The flare will consist of one skid mounted, self-supporting flare stack, utility flare tip, pilot with type K thermocouple, and an automatic ignition/monitoring system.

GreenGas will continuously monitor pilot temperature to ensure the presence of a flame. When operating as a control device for H₂S, the flare will utilize a natural gas pilot. When in operation, the flare will be enriched with natural gas to ensure full combustion. When needed, the flare may also be enriched with biogas or renewable natural gas.

EPA concluded that if a flare is being operated properly and according 40 CFR 60.18, flares should reach 98% destruction efficiency or better (see <https://www3.epa.gov/airtoxics/flare/2012flaretechreport.pdf>). The way to determine if the flare is operating properly is to determine the net heating value and the velocity of the gas per 40 CFR 60.18.

	Potential Emissions		
	Before Mod.	After Mod.	Emissions Change
PM/PM ₁₀ /PM _{2.5}	--	--	--
NO _x	--	1.69	+1.69
SO ₂	--	45.74	+45.74
CO	--	3.38	+3.38
VOC	--	.00207	+.00207
Max. Individual HAP	--	.00207	+.00207
Total HAP	--	.00207	+.00207
Total GHG (if applicable)	--	--	--

1. Total emissions from the RNG Facility flare include emissions from the Molecular Gate PSA Tail Gas and combustion of pilot/enrichment.
2. The Title V Major Source threshold is the minimum emissions required from each pollutant to be classified as a major source pursuant to 40 CFR 70.2 and GRAQC 391-3-1-.03(8)(c)13(i).
3. Major stationary source, as defined in 40 CFR 52.21(b)(1) from a non-categorical stationary source in an area in attainment for all regulated pollutants
4. HAP emissions are compared to the single HAP major source threshold as there is only one HAP (formaldehyde) emitted from the facility.

An example of the applicant's emission calculations for VOC and HAP emissions are examined below. Formaldehyde is the only HAP emitted from the facility. The emission factor for formaldehyde is based on U.S. EPA AP-42 Chapter 1.4 and is accurate.

$$\text{Formaldehyde Emissions (lb/hr)} = \text{Potential Fuel Usage (scf/hr)} \times \text{Emissions Factor (lb/MMscf)}$$

$$\text{Formaldehyde Emissions (lb/hr)} = 3850 \text{ (scf/hr)} \times .075 \text{ (lb/MMscf)}$$

$$\text{Formaldehyde Emissions (lb/hr)} = 2.89\text{E-}04 \text{ lb/hr}$$

$$\text{Formaldehyde Emissions (tpy)} = 2.89\text{E-}04 \text{ lb/hr} \times 4.38 = 1.27\text{E-}03 \text{ tpy}$$

Annual emissions (tpy) are based on annual hours of operation (e.g., 365 days per year, 24 hours per day = 8,760 hr/yr) and converted from pounds to tons (2000 lb = 1 ton). Detailed calculations for the remaining pollutants (H₂S, SO₂, NO_x, and CO) are presented in application No. 29349.

Regulatory Applicability

Georgia State Rules

Georgia Rule 391-3-1-.02(2)(b) – Visible Emissions

This rule (b) limits opacity from all stationary sources to less than 40%. This regulation also details monitoring requirements and work practice standards. This rule is applicable to operations at the RNG

Facility, although not anticipated there will be any emissions visible. GreenGas will always ensure compliance with this rule while operating the RNG Facility.

Georgia Rule 391-3-1-.02(2)(d) – Fuel Burning Equipment

This rule limits emissions from fuel burning equipment based on heat input capacity. Pursuant to GRAQC 391-3-1-.01(cc), fuel burning equipment is defined as:

“equipment the primary purpose of which is the production of thermal energy from the combustion of any fuel. Such equipment is generally that used for, but not limited to, heating water, generating or super heating steam, heating air as in warm air furnaces, furnishing process heat indirectly, through transfer by fluids or transmission through process vessel walls.”

The proposed flare does not meet the definition of fuel burning equipment as the primary purpose is for air emission control. As such, the requirements of this regulation do not apply at the RNG Facility

Georgia Rule 391-3-1-.02(2)(g) – Sulfur Dioxide

This regulation establishes SO₂ emission limits for fuel-burning sources. The emission sources at the facility will only combust tail gas (waste gas), and natural gas, all of which have sulfur content of less than 2.5% by weight. As such, the RNG facility will be inherently compliant with this regulation.

Georgia Rule 391-3-1-.02(2)(n) – Fugitive Emissions

This regulation requires facilities to take reasonable precautions to prevent fugitive dust from becoming airborne. Operations at the facility are covered by this generally applicable rule. The appropriate precautions will be taken to prevent fugitive dust from becoming airborne and ensure that opacity from fugitive dust sources is less than 20% as required by this rule.

Georgia Rule 391-3-1-.03(1) – Construction (SIP) Permit

This regulation requires that a permit be obtained from the director before any air-pollutant source is constructed or modified.

Georgia Rule 391-3-1-.03(2) – Operating (SIP) Permit

The regulation requires that a permit be obtained before an air-pollutant source is operated. The facility has submitted an application to comply with this regulation.

Non-Applicability of All Other GRAQC

A thorough examination of GRAQC applicability to the proposed operation reveals many GRAQC that do not apply and do not impose additional requirements. Such GRAQC rules include those specific to particular types of industrial operations, which will not be performed at the RNG Facility.

Federal Rules**40 CFR 52.21 New Source Review (NSR) – PSD Applicability**

NSR requires that federal permitting of new emission sources or modifications to existing emission sources be completed. Two distinct NSR permitting programs apply depending on whether the Facility is located in an attainment or nonattainment area for a particular pollutant. Non-attainment New Source Review (NNSR) permitting applies to new construction or modifications that result in emission increases of a particular pollutant for which the area in which the Facility is located is classified as “nonattainment” with respect to the National Ambient Air Quality Standards (NAAQS) for that pollutant. The Prevention of Significant Deterioration (PSD) program applies to project increases of those pollutants for which the area in which the facility is located is classified as “attainment” or “unclassifiable”.

The RNG Facility is located in Laurens County, which is classified as being in attainment with the NAAQS or unclassifiable for all regulated pollutants. As such, facilities in Laurens County are potentially subject to PSD permitting requirements for NO_x, VOC, PM₁₀, PM_{2.5}, SO₂, CO, lead and other PSD regulated pollutants.

Under PSD permitting rules for all criteria pollutants, the major source threshold is 250 tpy unless the Facility is listed specifically in 40 CFR 52.21 as having a lower 100 tpy threshold. Pipeline Transportation of Natural Gas and Rendering Plants are not on the list of 28 categories detailed in 40 CFR 52.21 with a lower threshold of 100 tpy. Because the Facility’s potential-to-emit for each of the attainment or unclassifiable pollutants is less than 250 tpy (major source threshold), the RNG Facility is not a major source under the PSD program

Single Stationary Source Designation

The RNG Facility at the Darling Plant will not meet the criteria for a single stationary source as follows:

Per 40 CFR 52.21(b)(5), a “stationary source” means:

Any building, structure, facility, or installation which emits or may emit a regulated NSR pollutant.

Per 40 CFR 52.21(b)(6) defines “building, structure, facility, or installation” as:

All of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control) except the activities of any vessel. Pollutant-emitting activities shall be considered as part of the same industrial grouping if they belong to the same “Major Group” (i.e., which have the same first two digit code) as described in the Standard Industrial Classification Manual, 1972, as amended by the 1977 Supplement (U.S. Government Printing Office stock numbers 4101-0066 and 003-005-00716-0, respectively).

Following the guidance published by EPA, three items are important in the determination of a single source: (1) same industrial grouping, (2) contiguous or adjacent properties, and (3) common control.

(1) Same Industrial Grouping:

The preamble of the PSD regulations, issued on August 7, 1980, clarifies the “industrial grouping” aspect of the definition:

Each source is to be classified according to its primary activity, which is determined by its principal product or group of products produced or distributed, or services rendered. Thus, one source classification encompasses both primary and support facilities, even when the latter includes units with a different two digit SIC code. Support facilities are typically those which convey, store or otherwise assist in the production of the principal product. Where a single unit is used to support two otherwise distinct sets of activities, the unit is to be included within the source which relies most heavily on its support.

The Primary NAICS code for the RNG Facility is 211130 – Natural Gas Extraction, and the SIC code is 1311 – Crude Petroleum and Natural Gas. The Darling Plant is the Primary NAICS code is 311613 (Rendering and Meat Byproduct Processing), and the SIC code is 2077 – Animal and Marine Fats and Oils. The SIC and NAICS codes for the facilities are different. Therefore, they are not of the same industrial grouping, and the criteria for “same industrial grouping” is not met.

(2) Contiguous or Adjacent Properties:

Per EPA guidance, “contiguous property” means:

Property that is adjoining. Public rights-of-way (e.g., railroads, highways) do not prevent property from being considered contiguous. Property connected only by rights-of-way are not considered contiguous (e.g., two plants with a connecting pipeline).

The RNG Facility will be located within a leased section of the existing Darling Plant property. Therefore, the properties are considered contiguous, and criteria for “contiguous or adjacent properties” is met.

(3) Common Control:

The intent of EPA in the use of the term “common control” is “guided by the general definition of control used by the Security and Exchange Commission (SEC)”. Specifically, control can be considered “common” if they are considered either of the following three types: (1) common ownership (i.e., the same parent company), (2) contractual requirements, or (3) dependence. The RNG Facility at the Darling Plant will not be under common ownership. The RNG Facility will be owned and operated by GreenGasUSA and the Darling Plant will continue to be operated by Darling Ingredients, Inc.

The RNG Facility at the Darling Plant will be located on contiguous or adjacent properties but will not be under common control or be in the same SIC Major Group. Therefore. The GreenGas RNG facility will be a separate stationary source.

40 CFR 60 Subpart A – General Provision

All affected sources subject to source-specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

4- CFR 60 OOOOa – Crude Oil and Natural Gas

NSPS Subpart OOOOa applies to onshore affected facilities located within the Crude Oil and Natural Gas Production source category, as defined in §60.5430a, for which you commence construction, modification, or reconstruction after September 18, 2015. The RNG Facility does not meet criteria for any of the affected facilities under the rule. Therefore, the rule does not apply.

Non-Applicability of All Other NSPS

NSPS standards are developed for particular industrial source categories and the applicability of a particular NSPS to a facility can be readily ascertained based on the industrial source category covered. There are no other NSPS potentially applicable to the RNG Facility.

40 CFR 61 – National Emission Standards for Hazardous Air Pollutants

NESHAP, located in 40 CFR 61 and 63, have been promulgated for source categories that emit HAP to the atmosphere. A facility that is a major source of HAP is defined as having potential emissions greater than 25 tpy of total HAP and/or 10 tpy of an individual HAP. Facilities with a potential to emit HAP at an amount less than that which is defined as a major source are otherwise considered an area source. The RNG Facility has potential HAP emissions below the major source thresholds and is, therefore, an area source of HAP.

The NESHAP allowable emissions limits are most often established based on a maximum achievable control technology (MACT) determination for the particular source. The NESHAP apply to sources in specifically regulated industrial source categories (Clean Air Act Section 112 (d)) or on a case-by-case basis (Section 112(g)) for facilities not regulated as specific industrial source types. The determination of applicability to NESHAP requirements are detailed in the following sections.

The National Emission Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR Part 61 are incorporated into the Georgia EPD Rules under 391-3-1-02. These rules are pollutant-specific regulations that limit emissions of HAP. GreenGas does not operate any emission units subject to these requirements. Therefore, no Part 61 NESHAP regulations apply.

40 CFR 63 Subpart A – General Provisions

NESHAP Subpart A, *General Provisions*, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

40 CFR 63 Subpart HHH – Natural Gas Transmission AND Storage Facilities

40 CFR 63 Subpart HHH regulates HAP emissions from natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to an end user

(if there is no local distribution company), and that are major sources of HAP. The RNG Facility will not meet the definition of a natural gas transmission facility and will not be a major source. Therefore, the rule does not apply to the RNG Facility.

Non-Applicability of All Other NESHAPs

NESHAP standards are developed for particular industrial source categories and the applicability of a particular NESHAP to a facility can be readily ascertained based on the industrial source category covered. There are no other NESHAPs potentially applicable to the RNG Facility.

40 CFR Part 98 – Greenhouse Gas Emissions

The GHG reporting requirements and related monitoring, recordkeeping, and reporting requirements of this part apply to the owners and operators of any facility that is located in the U.S. or under or attached to the Outer Continental Shelf (as defined in 43 U.S.C. 1331) and that meets the requirements of either paragraph (a)(1), (a)(2), (a)(3) of 40 CFR 98.2; and any supplier that meets the requirements of paragraph (a)(4) of 40 CFR 98.2. The RNG Facility will operate a flare that is a source listed in Subpart C of 40 CFR Part 98 – General Stationary Fuel Combustion Sources. GreenGas will comply with reporting requirements of Part 98, as applicable to the flare.

Permit Conditions

Condition 2.1 limits opacity from the Flare (Source Code FL01) and RNG Facility (Source Code RNG1) to less than forty (40) percent under Georgia Rule (b).

Condition 2.2 limits the sulfur content of fuel combusted in the flare (Source Code FL01) to less than 2.5 percent under Georgia Rule (g).

Condition 2.3 requires that all tail gas from the RNG Facility's (Source Code RNG1) Molecular Gate PSA are routed to the Flare (Source Code FL01) for combustion.

Condition 2.4 requires the Permittee to operate the flare (Source Code FL01) when processing RNG. This requirement was proposed by the Permittee to control emissions of hydrogen sulfide found in the tail gas which is routed to the flare.

Condition 3.1 requires reasonable precautions to prevent fugitive dust, per Rule (n).

Condition 3.2 limits the opacity from fugitive emissions to less than 20 percent.

Condition 4.1 requires the monitoring of the pilot flame of the flare (Source Code FL01) whenever gas is directed to the flare and record of the use of the flare.

Condition 7.1 requires notification to the Division upon start-up.

Condition 7.2 requires recordkeeping of the presence of the pilot flame whenever the flare is in use as required in Condition 4.1.

Condition 7.3 requires a deviation report if the gas is directed to the flare and the requirements of Condition 4.1 are not met (i.e. the pilot flame is not present).

Condition 7.4 details the requirement of the deviation report required in Condition 7.2.

Toxic Impact Assessment

Summary

The division requested that a toxics impact assessment (TIA) be completed as a part of the application. A TIA was conducted, and the facility passed the TIA. The following section details the assumptions used for completing the TIA and the results of the TIA.

Georgia EPD regulates the missions of TAP through a program approved under the provisions of GRAQC Rule 391-3-1-.02(2)(a)3(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the Georgia EPD's review of toxic air pollutant emissions as part of air permit reviews are contained in EPD's Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (the Guideline).

The Guideline has established the Allowable Ambient Concentration (AAC) and Minimum Emission Rate (MER) for each TAP, which are included in Appendix A of the Guideline. Additionally, procedures for establishing the AACs are included in Appendix C of the Guideline.

Determination

GreenGas evaluated emissions of two toxic air pollutants, Formaldehyde and Hydrogen Sulfide, that will be emitted as a result of RNG Facility operations.

Methodology

A TIA was performed in accordance with the Guideline. Section 2.2 of the Guideline requires a comparison between the facility-wide emission rate and the MER. For a pollutant that has a facility-wide emission rate above the MER, the Guideline requires the use of the Industrial Source Complex dispersion model (ISCST3) or the SCREEN3 screening model to determine the maximum ground level concentrations for TAP. Facility-wide emission rates are compared to the MER for the identified TAP, as shown in Table 5-1 of the application and as copied below

Table 5-1. TAP Emissions Comparison MER

Pollutant	Minimum Emission Rate¹ (lb/yr)	Facility-Wide Potential Emissions (lb/yr)	Is PTE > MER
Formaldehyde	2.67E+02	4.14E+00	No
Hydrogen Sulfide	4.87E+02	9.92E+02	Yes

From Appendix A of Georgia EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*

Hydrogen Sulfide has an emission rate above the respective MER; therefore, SCREEN3 was used to evaluate short-term (1-hour) concentration averages for the pollutant. The modeled 1-hour average concentration was then converted to a concentration in both shorter and longer-term averaging periods.

The emission sources were modeled from a vertical stack to represent the processes involved in the project. The emission point evaluated was the flare. The stack parameters and emission rates are summarized in Table 5-2 of the application and below.

Table 5-2. Flare Stack Parameters

Stack Type	Stack Configuration	Stack Height (ft)	Stack Diameter (ft)	Flow Rate (cfm)	Gas Velocity (ft/s)	Gas Temperature (F)	Total Heat Release (MMbtu/hr)	Distance to Fence Line (ft)
Fl01	Vertical	30.00	.33	63	12.03	120.0	2.80	93

$$1. \text{ Velocity (ft/s)} = \text{Flow Rate (cfm)} * 1 \text{ min}/60 \text{ s} / (\text{PI}) * (\text{Stack Diameter (ft)}/2)^2$$

Screen 3 Modeling Results

The impact of the stack was modeled using SCREEN3 and the parameters are listed in Table 5-2 of the application, respectively. The calculated maximum impacts were adjusted using the factors discussed earlier to obtain the estimated maximum impacts for the annual and 15-minute averaging periods. The predicted ambient air concentrations for Hydrogen Sulfide are presented in Table 5-3 of the application and below.

Table 5-3. Modeled Results

Pollutant	Maximum 1-Hour Concentration Distance (m)	Modeled Maximum 1-Hours Impact (ug/m ³)	Maximum 1-Hour Impact For Short-Term Limit ¹ (ug/m ³)	Maximum 1-Hour Impact For Annual Limit ¹ (ug/m ³)	Calculated 15-Minute Impact (ug/m ³)	15-Minute AAC ⁴ (ug/m ³)	Impact > AAC? (Yes/No)	Calculated Annual Impact ³ (ug/m ³)	Annual AAC ⁴ (ug/m ³)	Impact > AAC? (Yes/No)
Hydrogen Sulfide	97	63.5	9.06E-01	9.06E-01	1.20E+00	2.79E+03	No	7.25E-02	2.00E+00	No

1. Maximum 1-Hour Concentration equals the modeled impacts at 1.00 g/s multiplied by the actual emission rate.
2. The 15-minute impact equals the 1-hour impact times 1.32 per the EPD Guideline. The calculated impact shown here conservatively added results for short term in both operating scenarios, however it is unlikely that the two situations could happen within a given 15-minute period.
3. The annual impact equals the 1-hour impact times 0.08 per the EPD Guideline.
4. From Appendix A of the EPD Guideline.

As shown in the Table 5-3, impacts for Hydrogen Sulfide are below the respective AACs. Printouts of SCREEN3 modeling output files are included in Appendix D of the application.

The Division has reviewed the screen inputs and outputs and determined that the modeled results are accurate. The Division performed a summary of ambient impact assessment of toxic pollutants with the results given by SCREEN3 modeling and concluded that the 15-minute and annual impact acceptable and below the Allowable Ambient Concentration (AAC). The Division's results of the SCREEN3 analysis and Summary of Ambient Impact Assessment are provided below in Attachment B of this document.

Summary & Recommendations

I recommend that Permit No. 1311-175-0079-B-01-0 be issued to GreenGasUSA for the construction and operation of a new RNG Facility and gas collection and distribution system. The facility will be in East Dublin, Laurens County and will be a true minor source. The public advisory period ended on August 9, 2024, and no comments were received by the division.