

## **NARRATIVE**

TO: Heather Brown  
FROM: Wendy Troemel  
DATE: September 9, 2022

Facility Name: **LanzaJet Freedom Pines Fuels, LLC**  
AIRS No.: 283-00008  
Location: Soperton, GA (Treutlen County)  
Application #: 28455  
Date of Application: May 25, 2022, updated September 6, 2022

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### **Background Information and Purpose of Application**

LanzaJet Freedom Pines Fuels, LLC (“LanzaJet”) has submitted an application to construct and operate a facility that will manufacture up to 10 million gallons per year of sustainable aviation fuel and renewable diesel fuel derived from ethanol.

Application No. 28455 was received on June 8, 2022 and updated on September 6, 2022. A public advisory was issued on June 29, 2022 and expired on July 29, 2022. No comments were received. This greenfield site was assigned AIRS No. 283-00008.

### **Site Determination**

The facility will be located on leased property at the existing LanzaTech Freedom Pines Biorefinery (“LanzaTech”), AIRS No. 283-00005, permitted under Georgia Air Quality Permit Number 2869-283-0005-B-05-0. In order to determine if two facilities are part of the same “major source” under Title V or “stationary source” for NSR-PSD, all three of the following must apply:

1. Both belong to the same industrial grouping;
2. Both located on one or more contiguous or adjacent properties; and
3. Both under control of the same person (or persons).

The first two items apply to both facilities. Both facilities use the SIC code of 2869 (industrial organic chemicals, not elsewhere classified). LanzaJet is leasing land owned by LanzaTech and the two facilities might share utilities such as water and natural gas lines.

For the third item, based on the April 30, 2018, letter from William Wehrum (Asst. Administrator of EPA for Air and Radiation) to Patrick McDonnell (Pennsylvania DEP), it states:

“For Title V and NSR permitting purposes, ‘control’ assessment should be focused on the power or authority of one entity to dictate decisions of the other that could affect the applicability of, or the compliance with, relevant air pollution regulatory requirements.”

Additionally, dependency relationships should not be presumed to result in common control. While LanzaTech owns a portion of LanzaJet, Inc, the parent company of LanzaJet, it does not have a direct interest in LanzaJet, it will not be a majority owner (having a 25% voting interest), nor will LanzaTech make any decisions regarding air pollution regulatory requirements at LanzaJet. Therefore, these two facilities are not considered to be part of the same stationary source or major source on the basis of common control.

### **Process Description**

The facility will convert ethanol to Synthetic Paraffinic Kerosene (SPK or jet fuel) and Synthetic Paraffinic Diesel (SPD or diesel) via the production of ethylene. This process uses three conversion steps, followed by a final fractionation step to yield the desired jet or diesel product. The three steps include ethanol dehydration to ethylene (feed pretreatment, dehydration process, and separation), oligomerization of ethylene, and hydrogenation/fractionation. Additionally, the process includes tanks, cooling tower, natural gas boiler, scrubber, flares, product loadout, and unpaved roads.

### **Equipment List**

The facility held some information as business confidential, so in case where the exact specifications have met the definition of business confidential, the regulatory allowable thresholds will be used to calculate emissions.

#### **Process Equipment List**

Emission Units		Associated Control Devices	
Source Code	Description	Source Code	Description
E2E	Ethanol Dehydration to Ethylene Process (step 1)	LP-01, HP-01, SC-01	LP Flare, HP/Cold Flare, Scrubber
OLIG	Oligomerization of Ethylene Process (step 2)	LP-01, HP-01	LP Flare, HP/Cold Flare
HYFR	Hydrogenation and Final Fractionation Process (step 3)	LP-01, HP-01	LP Flare, HP/Cold Flare
PL-01	Product Loadout	None	None
CT-01	Cooling Tower	None	None
FUG1	Non-LDAR* Sources	None	None
FUG2	LDAR* Sources	None	None
FUG3	Unpaved Roads	None	None

\*LDAR – leak detection and repair

### Storage Tanks

Source Code	Capacity (gallons)	Contents	Install Date	True Vapor Pressure (psia)
ST-01	>39,800	Ethanol – IFR <sup>^</sup> – 40 CFR 60 Subpart Kb	2023	1.93 @ 86F
ST-02	>39,800	Jet Fuel – IFR <sup>^</sup>	2023	<0.51
ST-03	>39,800	Jet Fuel – IFR <sup>^</sup>	2023	<0.51
ST-04	>39,800	Jet Fuel – IFR <sup>^</sup>	2023	<0.51
ST-05	19,800-39,800	Diesel	2023	<2.18
ST-06	19,800-39,800	Diesel	2023	<2.18
ST-07	<19,800	Slop Oil	2023	N/A
ST-08	>39,800	Hydrogenation Reprocessing and off-spec - IFR <sup>^</sup>	2023	<0.51

<sup>^</sup>IFR – internal floating roof

### Fuel Burning Equipment

Source Code	Input Heat Capacity (MMBtu/hr)	Description	Installation Date
BL-01	72.7	Low NOx Burner with flue gas recirculation	2023

### Emissions Summary

The facility requested several limits to avoid classification as a major source of HAP and VOC.

#### Boiler Emissions

Emission factors from AP-42 Section 1.4 and manufacturer specifications (Cleaver-Brooks) were used to calculate emissions from the BL-01 boiler. The boiler will fire primarily natural gas with some vapor and liquid fuel streams from the process that are introduced into the flame zone. The boiler is equipped with low NO<sub>x</sub> burners and flue-gas recirculation. For arsenic emissions, the facility elected to use an emission factor that has previously been accepted by EPD for use with 40 CFR 63 Subpart DDDDD. To estimate HAP and toxic air pollutants (TAP) from the combustion of the process vapor/liquid fuel streams, the facility used best available engineering estimates, material balances around the process, and manufacturer estimated destruction efficiencies when introduced into the flame zone. The Division used the “Small Boiler Uncontrolled” emission factors in Tables 1.4-1 and 1.4-2 to calculate emissions from a boiler rated at 72.7 MMBtu/hr.

#### Equipment Leaks Emissions

All three major production areas as well as all support sections contain a variety of different equipment in VOC, HAP, and/or TAP service in light liquid, heavy liquid, and vapor service – pumps, valves, connection, open-ended lines, sampling connections, compressor, and pressure relief devices. All equipment leading up to the third step – Hydrogenation and Final Fractionation – will be subject to leak detection and repair (LDAR) under synthetic organic chemicals manufacturing industry (SOCMI) regulations. The third section and product loadout operations are not required to have an LDAR program.

Emissions were calculated using emission factors from Tables 2-1 and 2-5 of EPA's "*Protocol for Equipment Leak Emission Estimates*," estimated control efficiencies, total LDAR and non-LDAR component counts, and best available engineering estimates to calculate stream composition and VOC/HAP/TAP content. Over 4,000 components have been identified. The Division has reviewed the provided calculations and agrees with the emissions as represented in the tables below. Proper operation of the flares and scrubbers as well as regular inspections of the components will help keep emissions reduced.

#### Storage Tank Emissions

Feed ethanol will be brought in via truck and loaded into the ethanol storage tank with an internal floating roof (IFR). Four other sizeable tanks also have IFRs. The final products will be loaded into tanker trucks and shipped off-site. Emissions from the product tanker trucks are included as horizontal fixed roof tanks. Emissions were calculating using organic liquid characteristics from AP-42 Section 7.1.3.2. Emissions from tanks' breathing losses or product loading should not be significant with the internal floating roofs and precautions by the tanker trucks.

#### Flares and Scrubber Emissions

Two flares and a scrubber will be used to control VOC, HAP, and TAP emissions. The two flares will control emissions from the main production sections. The facility used emission factors from AP-42 Section 13.5 to calculate VOC, NO<sub>x</sub>, and CO from flaring, as well as heat and material balances for HAP and toxic air pollutants. For a specific vent stream that might contain air (thus preventing being vented to the flares), the scrubber is estimated to reduce emissions by at least 98%. The facility used this control efficiency and best available engineering estimates for stream composition and VOC emission calculations. The Division has reviewed the provided calculations and agrees with the emissions as represented in the tables below.

#### Water Cooling Tower Emissions

The facility will install a cooling tower that operates at 4,600 gal/min. The cooling tower emits PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions from TDS in the cooling tower drift loss. Emissions were calculated using emission factors from AP-42 Section 13.4. Assuming a natural draft tower type, the total liquid draft is  $6.4 \times 10^{-4}$  lb/10<sup>3</sup> gal. This gives a PM<sub>10</sub> emission rate of 1 tpy.

#### Unpaved Roads

Emissions were calculated using emission factors from AP-42 Section 13.2.2. It was assumed a tanker truck weighs 13 tons empty (Google) and ethanol or product weighs 7 lb/gallon. The facility estimate 3,179 vehicle miles would need to be traveled each year to bring in raw materials and haul out product. A silt content of 8.5% was used and 70% days without rain was assumed. Knowing that a full truck weighs 40 tons, using Equations 1a and 2, and the constants for Industrial Roads from Table 13.2.2-2, PM emission estimates were 14 tpy, PM<sub>10</sub> emissions were 4 tpy, and PM<sub>2.5</sub> emissions were 1 tpy.

**Facility-Wide Emissions CALCULATED by the Division**  
(tons per year) (rounded to nearest ton)

Source	PM/PM <sub>10</sub> /PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	CO	Hexane	Total HAP	VOC
72.7 MMBtu/hr boiler	3/1/2	32	1	27	1	1	2
Flares/Scrubbers	--	3	--	13	1	1	27
Equipment Leaks	--	--	--	--	1	1	43
Unpaved Roads	14/4/1	--	--	--	--	--	--
Storage Tanks	--	--	--	--	--	1	1
Cooling Tower – 380 ppm TDS	1/1/1	--	--	--	--	--	--
<b>TOTALS</b>	<b>18/6/4</b>	<b>35</b>	<b>1</b>	<b>40</b>	<b>3</b>	<b>4</b>	<b>73</b>

Pollutant	Facility-Wide Calculated Emissions (tpy)	Facility Provided Emissions (tpy)
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	18/6/4	19.32/9.49/5.95
NO <sub>x</sub>	35	33.54
SO <sub>2</sub>	1	0.19
CO	40	30.00
VOC	73	71.25
Max. Individual HAP (hexane)	3	1.09
Total HAP	4	1.58

The emissions as calculated by the Division and the emissions provided by the facility are reasonably similar with the exception of CO emissions. The facility has a vendor-guaranteed CO ppm limit for the boiler that is lower than AP-42 emission factors. These calculations demonstrate that the facility-provided emissions are reasonable and appropriate for a synthetic minor facility status.

**Regulatory Applicability****FEDERAL RULES***New Source Review - Prevention of Significant Deterioration (40 CFR 52.21)/Part 70 Applicability*

The proposed facility is located in an attainment area. Chemical process plants, which include SIC Code 2869, are in the listed PSD 28 source categories (40 CFR 52.21(b)(1)(i)(a)); therefore, the major source threshold is 100 tpy for all regulated NSR pollutants, and fugitive emissions must be included in emissions calculations. The facility has requested a 100 tpy emission limitation for VOC to be classified as a minor source and avoid being subject to the Part 70 Title V Operating program. Additionally, the facility has requested a 10/25 tpy HAP limitation to remain classified as an area source under 40 CFR 63. The facility will be required to create a protocol for calculating emissions and track monthly and rolling 12-month usage of VOC and HAP to assure compliance with these avoidance limits. All other pollutants are well under the major source thresholds.

*40 CFR 60 Subpart Dc – NSPS for Small Industrial-Commercial-Institutional Steam Generating Units*

Subpart Dc applies to steam generating units with a heat input capacity of between 10-100 MMBtu/hr. Rated at 72.7 MMBtu/hr, the BL-01 boiler is subject to 40 CFR 60 Subpart Dc. However, the unit is restricted to firing natural gas and certain process vapor and liquid streams. Because these process vapor and liquid streams are not derived from crude oil or petroleum, these streams do not meet the definition for fuel oil combustion. Therefore, the PM, opacity, and SO<sub>2</sub> emission limitations and associated monitoring do not apply. The facility will be required to submit reports upon construction and startup of the unit and maintain records of fuel usage.

*40 CFR 60 Subpart Kb – NSPS for Volatile Organic Liquid Storage Vessels*

Subpart Kb applies to storage vessels constructed or modified after July 23, 1984, with a capacity above 75 m<sup>3</sup> (about 19,800 gallons) that are used to store volatile organic liquids. All tanks except ST-07 have capacities greater than 19,800 gallons. The facility will utilize internal floating roofs per 40 CFR 60.112b(a)(1) for tanks ST-01, ST-2, ST-03, ST-04, and ST-08. Based on vapor pressure and capacity, only ST-01 is subject to inspections and records of such inspections; for all other tanks, the facility will need to maintain records of size, vapor pressure, and period of storage for each applicable tank.

*40 CFR 60 Subparts NNN and RRR – NSPSs for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) – Distillation Operations and Reactor Processes*

The facility is subject to these rules due to the first two steps in the manufacturing process – ethanol dehydration to ethylene and oligomerization of ethylene – that produce chemicals listed in 40 CFR 60.667 and 40 CFR 60.707 as either a product, co-product, by-product, or intermediate. Several affected streams will be incinerated in the boiler and one stream will be vented to a scrubber. The streams might also be vented to the flare as well, which must meet the requirements of 40 CFR 60.18. Both the boiler and scrubber must achieve 98% by weight emissions reduction or 20 ppmv total organic compounds (less methane and ethane). The facility must monitor flow rates, conduct initial performance tests, and keep records for reporting. The scrubber has been approved as alternative monitoring under both regulations per EPA's Applicability Determination Index Control Number 9400005.

*40 CFR 60 Subpart VVa – NSPSs for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Equipment Leaks*

This regulation seeks to minimize VOC emissions from equipment leaks through a monitoring and repair program. The facility has well over 3,000 pump and compressor seals, valves, connectors, pressure relief devices, open-ended lines, and sampling connections that are in the first two process steps subject to LDAR under SOCMI regulations. These components are in light liquid, heavy liquid, vapor, and two-phase service. There are approximately 1,000 such devices that are not in LDAR as they are in the third step of the process that is not subject to SOCMI regulations.

*40 CFR 63 Subpart JJJJJJ – NESHAP for Industrial, Commercial, and Institutional Boilers (area sources)*

The BL-01 boiler is not subject to 40 CFR 63 Subpart DDDDD since the facility is a minor source of HAP. 40 CFR 63 Subpart JJJJJ applies to each boiler at area sources of HAP. However, under 40 CFR 63.11195(e), gas-fired boilers, as defined in 40 CFR 63.11237, are not subject to Subpart JJJJJ. A gas-fired boiler is defined as “any boiler that burns gaseous fuels,” which includes natural gas. There is an exemption provided in 40 CFR 63.11195(g) for the firing of process streams, but the BL-01 boiler does not qualify for it.

The process vapor and liquid streams are not derived from crude oil or petroleum; however, the rule does not provide a definition for liquid biodiesel. The process liquid stream does meet the sulfur requirement in the ultra-low-sulfur liquid fuel definition, but not the distillate oil definition. Therefore, the facility will follow the compliance requirements for a new oil and non-ultra-low-sulfur liquid fuel fired boiler. They will be subject to a PM emission limit while firing process liquid fuel and conduct an initial performance test and subsequent follow-up tests periodically. Emissions must be minimized upon startup and shutdown, and initial and biennial tune-ups are required.

## GEORGIA RULES

*Georgia Rule (b) – Visible Emissions*

This rule limits the visible emissions of all sources to 40% opacity. This rule applies to all sources at the facility unless a more specific visible emissions limit is established elsewhere in the Georgia Rules.

*Georgia Rule (d) – Fuel-burning Equipment*

This rule establishes particulate matter emission limits for fuel-burning equipment based on the heat input of the equipment. This rule applies to the facility’s natural gas boiler. PM emissions from the combustion of natural gas as well as the process vapor and liquid streams are much less than the allowable PM emission limit.

*Georgia Rule (e) – PM from Manufacturing Processes*

This rule establishes PM emissions from all manufacturing processes based on process input rates.

*Georgia Rule (g) – Sulfur Dioxide*

This rule requires fuel burning sources with less than 100 MMBtu/hr heat inputs to only burn fuels containing less than 2.5% sulfur. This rule applies to the BL-01 boiler. Natural gas and the process streams have a sulfur content much less than 2.5% and are inherently compliant with this rule.

*Georgia Rule (n) – Fugitive Dust*

This rule requires that reasonable precautions be taken to prevent fugitive dust from becoming airborne. The rule also limits the opacity of fugitive dust to less than 20%.

**RULES AND REGULATIONS THAT ARE NOT APPLICABLE**

There are many State and Federal rules and regulations that are applicable to petroleum refineries, petroleum processing, and gasoline distribution and terminals. However, since the fuel and diesel produced at this facility is derived from ethanol and not crude oil, these regulations do not apply. Additionally, due to the synthetic minor limit for HAP, none of the Part 63 major source NESHAPs apply either.

***40 CFR 60 Subpart CCCC/DDDD – NSPS for CISWI***

Boilers and flares are not defined as incinerators as they do not burn solid wastes. Additionally, the process vapor and liquid streams meet the definition of traditional fuels and are not discarded or solid waste.

***40 CFR 63 Subpart VVVVVV – Area Source NESHAP for Chemical Manufacturing***

Ethanol can contain acetaldehyde, which is listed in Table 1 as an applicable HAP. However, it is an impurity at less than 0.1 percent by weight. According to 40 CFR 63.11494(a)(2)(i), the facility can use an MSDS to prove compliance with the regulation.

***Georgia Rule (c) – Incinerators***

This rule does not apply to any vent gas incineration devices that are used as air pollution control equipment. Therefore, the flares and boiler do not qualify as incinerators.

**Permit Conditions**

Conditions 1.1 through 1.5 are general conditions that apply to all SIP sources.

Condition 2.1 limits the facility to less than 100 tpy VOC emissions. The facility requested this limit to avoid major source classification and to avoid a PSD review.

Condition 2.2 limits the facility to less than 10 tpy of any individual HAP and less than 25 tpy of all combined HAP. The facility requested this limit to remain classified as an area source for HAP.

Condition 2.3 subjects the storage tanks to all applicable requirements of 40 CFR 60 Subparts A and Kb.

Condition 2.4 outlines the internal floating roof requirements for the storage tanks ST-01 subject to 40 CFR 60 Subpart Kb.

Condition 2.5 subjects the distillation operations in the first two process steps E2E and OLIG to all applicable requirements of 40 CFR 60 Subparts A and NNN.

Condition 2.6 subjects the reactor operations in the first two process steps E2E and OLIG to all applicable requirements of 40 CFR 60 Subparts A and RRR.

Condition 2.7 outlines the control technologies and requirements for the 1<sup>st</sup> and 2<sup>nd</sup> process steps under 40 CFR 60 Subparts NNN and RRR.

Condition 2.8 subjects all pump and compressor seals, valves, connectors, pressure relief devices, open-ended lines, and sampling connections in light liquid, heavy liquid, vapor, and two-phase service within the first two process steps E2E and OLIG to all applicable requirements of 40 CFR 60 Subparts A and VVa.

Condition 2.9 states the facility shall be in compliance with a leak detection and repair program within 180 days of initial startup under 40 CFR 60 Subpart VVa.

Condition 2.10 subjects the boiler to all applicable requirements of 40 CFR 60 Subparts A and Dc.

Condition 2.11 subjects the boiler to all applicable requirements of 40 CFR 63 Subparts A and JJJJJJ.

Condition 2.12 limits the boiler BL-01 to PM emissions of 0.03 lb/MMBtu while combusting liquid process streams under 40 CFR 63 Subpart JJJJJJ.

Condition 2.13 limits the boiler BL-01 to firing only natural gas and process vapor and liquid streams.

Condition 2.14 subjects all process equipment to an opacity of 40% under Georgia Rule (b).

Condition 2.15 subjects the boiler BL-01 to the PM and opacity requirements of Georgia Rule (d).

Condition 2.16 subjects to all applicable equipment to the requirements of Georgia Rule (e).

Condition 3.1 is the general fugitive emission requirement under Georgia Rule (n).

Condition 4.1 is a general condition that requires the facility to perform routine maintenance in order to keep air pollution control equipment in good working order.

Condition 4.2 outlines the parameters the facility must continue monitoring after performance testing.

Condition 5.1 lists the monitoring parameters and frequency of data collection for the flares and scrubber.

Condition 5.2 outlines the inspection of the internal floating roof tank for Storage Tank ST-01 under 40 CFR 60 Subpart Kb.

Condition 5.3 outlines the monitoring devices needed for the flares, boiler, and scrubber for combusting streams from 40 CFR 60 Subpart NNN and RRR process streams.

Condition 5.4 outlines the initial and subsequent biennial tune-ups required for boiler BL-01 under 40 CFR 63 Subpart JJJJJJ.

Condition 6.1 and 6.2 are general testing provisions that applies to all sources.

Condition 6.3 outlines the test methods for the facility.

Condition 6.4 requires the facility to conduct performance test for VOC and HAP emissions from scrubber SC-01 under 40 CFR 60 Subparts NNN and RRR. Per 40 CFR 60.662(a), the boiler does not need to be tested as the vent streams will be introduced into the boiler with the primary fuel.

Condition 6.5 requires the facility to test the boiler for PM emissions while firing liquid process fuel. This test will be repeated either every 3 years or, if the allowable emissions are half the limit, then every 5 years.

Conditions 7.1 and 7.2 are general provisions that apply to all sources.

Condition 7.3 is a general requirement to notify the Division upon startup of the facility.

Condition 7.4 outlines the recordkeeping and reporting requirements under 40 CFR 60 Subpart Kb for Storage Tank ST-01.

Conditions 7.5 through 7.8 outline the recordkeeping and reporting for all other storage tanks.

Conditions 7.9 through 7.12 outline the recordkeeping for 40 CFR 60 Subparts NNN and RRR.

Condition 7.13 and 7.14 outline the startup notification and recordkeeping needed for Boiler BL-01 under 40 CFR 60 Subpart Dc.

Conditions 7.15 through 7.18 outline the 40 CFR 63 Subpart JJJJJ reporting and recordkeeping requirements for Boiler BL-01.

Condition 7.19 requires the facility to comply with the recordkeeping requirements of 40 CFR 60 Subpart VVa.

Condition 7.20 requires the facility to submit an initial semiannual report under 40 CFR 60 Subpart VVa.

Condition 7.21 requires the facility to submit a protocol to be used to calculate monthly and 12 month rolling totals of VOC and HAP emissions.

Conditions 7.22 and 7.23 require the facility to calculate monthly and 12 month rolling total HAP emissions.

Conditions 7.24 and 7.25 require the facility to calculate monthly and 12 month rolling total VOC emissions.

Condition 7.26 outlines the information required to be submitted in all the semiannual reports for 40 CFR 60 Subparts NNN, RRR, VVa, and facility-wide VOC and HAP emissions.

Condition 8.1 is a general condition that applies to all Georgia air permits.

Condition 8.2 requires the facility to calculate and pay air permit fees.

### **Toxic Impact Assessment**

The facility evaluated emissions of listed TAP emissions as required by the Georgia *Guidelines for Ambient Impact Assessment*. All TAP emissions are below the minimum emission rate (MER) as allowed by the guidelines. No further analysis for these pollutants is needed.

### **Summary & Recommendations**

The public advisory for the LanzaJet Freedom Pines Fuels, LLC facility expired on July 29, 2022, and no comments were received. The facility has been classified as a synthetic minor source (for HAP) and the appropriate operating requirements have been included in this "S" permit. The facility has paid the appropriate permit fees. The facility has indicated that it can comply with all applicable rules and regulations; therefore, I recommend that Air Quality Permit No. 2869-283-0008-S-01-0 be issued to LanzaJet Freedom Pines Fuels, LLC.