Commonwealth of Kentucky
Division for Air Quality

STATEMENT OF BASIS / SUMMARY

Title V / Synthetic Minor, Operating
PERMIT ID: V-23-041
Marrillia Environmental
360 Ranch Rd, Mount Washington, KY 40047
November 30, 2023
Michael Baidy, Reviewer

Source ID: 21-029-00045
Agency Interest #: 70880
Activity ID: APE20230002

Table of Contents

SECTION 1 - SOURCE DESCRIPTION

SIC Code and description: 4953, Refuse Systems (materials recovery facilities).

Single Source Det. ☐ Yes ☒ No If Yes, Affiliated Source AI:

Source-wide Limit ☐ Yes ☒ No If Yes, See Section 4, Table A

28 Source Category ☐ Yes ☒ No If Yes, Category:

County: Bullitt
Nonattainment Area ☒ N/A ☐ PM_{10} ☐ $PM_{2.5}$ ☐ CO ☐ NO_X ☐ SO_2 ☐ Ozone ☐ Lead
If yes, list Classification:

PTE* greater than 100 tpy for any criteria air pollutant ☐ Yes ☒ No
If yes, for what pollutant(s)?
☐ PM_{10} ☐ $PM_{2.5}$ ☐ CO ☐ NO_X ☐ SO_2 ☐ VOC

PTE* greater than 250 tpy for any criteria air pollutant ☐ Yes ☒ No
If yes, for what pollutant(s)?
☐ PM_{10} ☐ $PM_{2.5}$ ☐ CO ☐ NO_X ☐ SO_2 ☐ VOC

PTE* greater than 10 tpy for any single hazardous air pollutant (HAP) ☐ Yes ☒ No
If yes, list which pollutant(s):

PTE* greater than 25 tpy for combined HAP ☐ Yes ☒ No

*PTE does not include self-imposed emission limitations.

Description of Facility:
Marrillia Environmental, LLC is a waste transfer station that incinerates wood. Wood material is brought in by the truckload. An air curtain incinerator is used to burn clean lumber, wood waste, and yard waste, while an 88-hp diesel engine provides oxygen to the chamber for a more complete combustion process. Ash is mixed with dirt to be used later as fill dirt. Per 40 CFR 60.2242, Marrillia has been issued a Title V permit.

SECTION 2 – CURRENT APPLICATION AND EMISSION SUMMARY FORM

Permit Number: V-23-041 Activity: APE20230002
Application Received: 10/30/2023 Application Complete: 1/1/2024

Permit Action: ☐Initial ☒Renewal ☐Significant Rev. ☐Minor Rev. ☐Administrative

Construction/Modification Requested? ☐ Yes ☒ No NSR Applicable? ☐ Yes ☒ No

Previous 502(b)(10) or Off-Permit Changes incorporated with this permit action ☐ Yes ☒ No

Description of Action:
Marrillia Enviornmental LLC requests a permit renewal with no changes.

V-23-041 Emission Summary		
Pollutant	2022 Actual (tpy)	PTE V-23-001 (tpy)
CO	4.35E-01	21.49
NOx	8.47E-01	5.78
PT	4.73E-01	11.19
PM_{10}	4.73E-01	11.19
$PM_{2.5}$	4.13E-01	11.12
SO_2	7.13E-02	1.00
VOC	2.35	89.60
Lead	N/A	0
Greenhouse Gases (GHGs)		
Carbon Dioxide	28.35	107.32
Methane	N/A	0
Nitrous Oxide	N/A	0
CO_2 Equivalent (CO_2e)	28.35	107.32
Hazardous Air Pollutants (HAPs)		
Combined HAPs:	N/A	2.53E-03

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS

Emission Unit # 01 Air Curtain Incinerator (Mechanical Combustion Unit)				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
PM	0.18 g/dscm (0.08 gr/dscf) on a 1 hr average corrected to 12% CO_2 excluding the contribution of CO_2 from auxiliary fuel	401 KAR 59:020, Section 3(3)	1.3 lb/ton (Clerico, B. and Villegas, E. (2017). Air Curtain Incinerator Emissions Factors Determinations. Table 3: Emissions Factors for Air Curtain Incinerator Burning Woody Biomass)	Operating procedure and emissions calculations (See comments below)
Opacity	10% opacity, except for 20% during the startup period	40 CFR 60.2250 & 401 KAR 59:020, Section 3(1)	N/A	Daily qualitative visual observations. U.S. EPA Method 9 if visible emissions present.
VOC	Source-wide 90 tpy	To preclude 401 KAR 51:052	11 lb/ton (AP-42 Ch. 2.7 Table 2.7-1)	Operating procedure and emissions calculations (See comments below)

Initial Construction Date: 8/1/2007

Process Description:
The air curtain incinerator burns wood products to create ash that is mixed into the topsoil sold by Marrillia Environmental. Clean lumber, wood waste, and/or yard waste is loaded into the combustion chamber. The air curtain injects a curtain of air across the open chamber to allow for more complete combustion than burning alone.

Applicable Regulation:
401 KAR 59:020, *New Incinerators* is applicable to incinerators that commenced operation on or after August 17, 1971, with a charging rate of more than 50 tons/day.

401 KAR 60:005, Section 2(2)(bbbb), 40 C.F.R. 60.2000 to 60.2265, Tables 1 to 8 (Subpart CCCC), *Standards of Performance for Commercial and Industrial Solid Waste Incineration Units* is applicable because the unit is an air curtain incinerator as defined in 40 CFR 60.2265. The permittee operating an air curtain incinerator must obtain a Title V permit [40 CFR 60.2242].

Precluded Regulations:
401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas* is precluded because the facility has taken limits on VOC and $PM_{2.5}$ emissions to preclude the regulation. Bullitt county was designated non-attainment for the 8-hour ozone (1997) and $PM_{2.5}$ (1997) standards as the initial application was received (7/7/2006). In August 2007, Bullitt county was redesignated to attainment, for VOC however the limits taken to preclude 401 KAR 51:052 has remained.

Comments:
Whitton Technologies Model Number S327
Heat input capacity: 10 tons of wood / hr

Emission Unit # 01 Air Curtain Incinerator (Mechanical Combustion Unit)

Primary fuel sources: clean lumber, wood waste, and yard waste

Equations for emissions calculation:
VOC emissions (tons) = tons of wood burned in every 12 consecutive months times an emission factor of 11 lbs./ton divided by 2000 lbs./ton

PM emissions (tons) = tons of wood burned in every 12 consecutive months times an emission factor of 1.3 lbs./ton divided by 2000 lbs./ton

The original application used a PM emission factor of 13 lb/ton with dust suppression control device was reported to be 85% efficient at controlling PM emissions resulting in 19.5 lb/hr controlled emissions. However upon review of later scientific articles on emission factor determinations for air curtain incinerator, show the values to be much lower and the control being inherent. Actual test reports submitted by the permittee has shown the average emissions to be 2.14 lb/hr which is much lower than the controlled emission factor of 19.5 lb/hr used in the emissions inventory. Hence the Division has updated the emission factor for PM to 1.3 lb/ton including controls.

The CO emission factor of 1.3 lb/ton (13 lb/hr) of wood incinerated used in the emissions inventory is much lower than the value shown in the actual test report (≈ 20 lb/hr) conducted on Whitton Technologies air curtain incinerator. The emission factor used in the current pollutants of concern table is 2.6 lb/ton (26 lb/hr) based on Clerico, B. and Villegas, E. (2017). Air Curtain Incenerator Emissions Factors Determinations. Table 3: Emissions Factors for Air Curtain Incinerator Burning Woody Biomass.

The VOC emission factor used in the inventory is 11 lb/ton on wood incinerated and is based on values from AP-42 Chapter 2.7, Table 2.7-1 for conical burners with no controls. There is not much comparable and reliable scientific study and accepted emission factor for VOC, however the newer air curtain incinerators applications have used 0.9 lb/ton. The Division has not updated the emission factor for VOC.

According to 40 CFR 60.2250(b), opacity shall not exceed 35% during the startup period that is within the first 30 minutes of operation. However, 401 KAR 59:020, Section 3(1) states that affected facilities shall not produce emissions with an opacity greater than 20%. Therefore, in writing the renewal permit V-23-041, 20% was utilized as it is the stricter limitation out of the two.

The vast majority of emissions are emitted by the air curtain incinerator, while the diesel engine and material handling activities not only emit much smaller quantities, their highest pollutants do not coincide with the pollutants that limit the air curtain incinerator. The limiting pollutant for the air curtain incinerator is volatile organic compounds (89.41 tons per year as proposed), whereas the highest emitted pollutant by the diesel generator is NOX (2.90 tons per year) and the highest emitted pollutant for material handling is fugitive emissions (1.36 tons per year). To limit the number of calculations necessary to show compliance with the 100 ton annual limit, the air curtain incinerator shall be limited to 90 tons of emissions per 12-consecutive months for each pollutant, which is approximately equal to the level of emissions proposed in the the application. Ten tons should be an adequate cushion to account for the emissions from the smaller units as well as to ensure that 100 tons of any pollutant are not exceeded. Accordingly, operating limits shall be established to ensure that activity levels do not exceed the levels proposed in the application.

Emission Unit # 02 88-hp Kubota Stationary Diesel Engine				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
Opacity	20% during acceleration mode; 15% during lugging mode; 50% during peaks in either mode	40 CFR 1039.105(b)	N/A	Measuring and calculating the smoke opacity levels as specified in 40 CFR 1039.501(c)

Initial Construction Date: 8/1/2007

Process Description:
The diesel engine acts as a pump which pumps air to the air curtain incinerator. The air injection allows the incinerator to operate as intended and perform a more complete combustion than other burning processes.

Applicable Regulation:
401 KAR 60:005, Section 2(2)(dddd), 40 C.F.R. 60.4200 to 60.4219, Tables 1 to 8 (Subpart IIII), *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* is applicable to stationary CI ICE manufactured after April 1, 2006 and are not fire pump engines [40 CFR 60.4200(a)(2)(i)].

401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 through 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines* is applicable. Pursuant to 40 CFR 63.6590(c)(1), new or reconstructed stationary RICE located at an area source shall meet the requirements of 40 CFR 63, Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart IIII. No further requirements apply to this engine under 40 CFR 63 [40 CFR 63.6590(c)(1)].

Precluded Regulations:
401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas* is precluded for VOC and $PM_{2.5}$.

Comments:
Stationary compression ignition diesel engine.
Kubota model number 5KBXL02.0FAC
88 HP, 1.99 L displacement, model year 2005
Certification number: KBX-NR3-05-14

The air injection system results in a more complete combustion process which reduces PM emissions from the incinerator.

Emission Unit # 03 Wood and Ash Handling

Initial Construction Date: 8/1/2007

Process Description:
This "emission unit" covers handling and moving wood and ash materials both before and after incineration.

Applicable Regulation:
401 KAR 63:010, *Fugitive Emissions* is applicable because the emission unit is an operation which emits or could emit fugitive emissions not elsewhere subject to an opacity standard within 401 KAR Chapters 50 through 68 [401 KAR 63:010, Section 1(1)].

Precluded Regulations:
401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas* for $PM_{2.5}$ is precluded because the facility limited the amount of material handled per year to preclude the regulation.

Comments:
None

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS (CONTINUED)

Testing Requirements\Results

Emission Unit(s)	Control Device	Parameter	Regulatory Basis	Frequency	Test Method	Permit Limit	Test Result	Thruput and Operating Parameter(s) Established During Test	Activity Graybar	Date of last Compliance Testing
EU01	N/A	Opacity	401 KAR 59:020, Section 6 40 CFR 60.2255	Initial and when emissions are visible	U.S. EPA Reference Method 9	10% on 6-min average and 35% during startup within 30-min period	Pass	N/A	CMN20140001	8/22/2014

Footnotes:
A source required to conduct a performance test shall submit a completed Compliance Test Protocol form, DEP form 6028, or a test protocol a source has developed for submission to other regulatory agencies, in a format approved by the cabinet, to the cabinet's Division for Air Quality a minimum of sixty (60) days prior to the scheduled test date [401 KAR 50:045, Section 2(1)]

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS

Table A - Group Requirements:

Emission and Operating Limit	Regulation	Emission Unit
90 tpy of $PM_{2.5}$ emissions	To preclude the applicability of 401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas*	EU01
90 tpy of VOC emissions	To preclude the applicability of 401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas*	EU02
2,125 hours of operation per 12 consecutive months	To preclude the applicability of 401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas*	EU02
16.256 tpy of wood and ash material	To preclude the applicability of 401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas*	EU03

Table B - Summary of Applicable Regulations:

Applicable Regulations	Emission Unit
401 KAR 59:020, *New Incinerators*	EU 01
401 KAR 63:010, *Fugitive Emissions*	EU 03
401 KAR 60:005, Section 2(2)(bbbb), 40 C.F.R. 60.2000 to 60.2265, Tables 1 to 8 (Subpart CCCC), *Standards of Performance for Commercial and Industrial Solid Waste Incineration Units*	EU 01
401 KAR 60:005, Section 2(2)(dddd), 40 C.F.R. 60.4200 to 60.4219, Tables 1 to 8 (Subpart IIII), *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*	EU 02
401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 through 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*	EU 02

Table C - Summary of Precluded Regulations:

Precluded Regulations	Emission Unit
401 KAR 51:052, *Review of New Sources In or Impacting Nonattainment Areas*	SOURCE-WIDE

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS (CONTINUED)

Table D - Summary of Non Applicable Regulations:

N/A

Air Toxic Analysis

N/A

Single Source Determination

N/A

SECTION 5 - PERMITTING HISTORY

Permit	Permit Type	Activity#	Complete Date	Issuance Date	Summary of Action	PSD/Syn Minor
F-07-040	Initial	APE2007001	7/19/2007	11/20/2007	Initial Construction	N/A
F-12-048	Renewal	APE20120001	6/26/2012	12/07/2012	Renewal, no equipment changes, incorporates regulation revisions	N/A
V-17-039	Initial	APE20170002	11/6/2017	1/13/2019	Initial Title V Permit	N/A

SECTION 6 – PERMIT APPLICATION HISTORY:

N/A

APPENDIX A – ABBREVIATIONS AND ACRONYMS

AAQS – Ambient Air Quality Standards
BACT – Best Available Control Technology
Btu – British thermal unit
CAM – Compliance Assurance Monitoring
CO – Carbon Monoxide
Division – Kentucky Division for Air Quality
ESP – Electrostatic Precipitator
GHG – Greenhouse Gas
HAP – Hazardous Air Pollutant
HF – Hydrogen Fluoride (Gaseous)
MSDS – Material Safety Data Sheets
mmHg – Millimeter of mercury column height
NAAQS – National Ambient Air Quality Standards
NESHAP – National Emissions Standards for Hazardous Air Pollutants
NO_x – Nitrogen Oxides
NSR – New Source Review
PM – Particulate Matter
PM_{10} – Particulate Matter equal to or smaller than 10 micrometers
$PM_{2.5}$ – Particulate Matter equal to or smaller than 2.5 micrometers
PSD – Prevention of Significant Deterioration
PTE – Potential to Emit
SO_2 – Sulfur Dioxide
TF – Total Fluoride (Particulate & Gaseous)
VOC – Volatile Organic Compounds