MARYLAND DEPARTMENT OF THE ENVIRONMENT

AIR AND RADIATION ADMINISTRATION
APPLICATION FOR A PERMIT TO CONSTRUCT

DOCKET #02-24

COMPANY: Allegany Biochar, LLC

LOCATION: 11600 Pittsburgh Plate Glass Road SE, Cumberland, MD 21502

APPLICATION: Installation of a Biochar Processing Facility

ITEM	DESCRIPTION
1	Notice of Application and Informational Meeting
2	Environmental Justice (EJ) Information - EJ Fact Sheet and MDE Score and Screening Report
3	Permit to Construct Application Forms - Four (4) Form 5s - One (1) Form 5T - Four (4) Form 5EPs - Seven (7) Form 6s
4	Supplemental Information - Manufacturer specifications - Process Flow Diagrams - Site Plans - Emissions Calculations
5	Evidence of Zoning Approval

DEPARTMENT OF THE ENVIRONMENT
AIR AND RADIATION ADMINISTRATION

NOTICE OF APPLICATION AND INFORMATIONAL MEETING

The Maryland Department of the Environment, Air and Radiation Administration (ARA) received a permit-to-construct application from Allegany Biochar, LLC on January 5, 2024 for the installation of a Biochar Processing Facility. The proposed installation will be located at 11600 Pittsburgh Plate Glass Road SE, Cumberland, MD 21502.

In accordance with HB 1200/Ch. 588 of 2022, the applicant provided an environmental justice (EJ) Score for the census tract in which the project is located using the Maryland EJ Screening Tool. The EJ Score, expressed as a statewide percentile, was shown to be 60.22 which the Department has verified. This score considers three demographic indicators – minority population above 50%, poverty rate above 25% and limited English proficiency above 15%. Multiple environmental health indicators are used to identify overburdened communities.

Copies of the application, the MDE EJ Screening Tool Report (which includes the score), and other supporting documents are available for public inspection on the Department's website at https://mde.maryland.gov/programs/Permits/AirManagementPermits/Pages/index.aspx (click on Docket Number 02-24). Any applicant-provided information regarding a description of the environmental and socioeconomic indicators contributing to that EJ score can also be found at the listed website. Such information has not yet been reviewed by the Department. A review of the submitted information will be conducted when the Department undertakes its technical review of all documents included in the application.

Pursuant to the Environment Article, Section 1-603, Annotated Code of Maryland, an Informational Meeting has been scheduled so that citizens can discuss the application and the permit review process with the applicant and the Department.

An Informational Meeting will be held on March 6, 2024 at 5:30 PM at the Allegany County Department of Emergency Services, 11400 Pittsburgh Plate Glass Road SE, Cumberland, MD 21502. In the case of inclement weather, the meeting will be held at the same time on March 11, 2024.

The Department will provide an interpreter for deaf and hearing impaired persons provided that a request is made for such service at least ten (10) days prior to the meeting.

Further information may be obtained by calling Ms. Shannon Heafey at 410-537-4433.

Christopher R. Hoagland, Director
Air and Radiation Administration

Maryland
Department of
the Environment

The Applicant's Guide to Environmental Justice and Permitting

What You Need to Know

This fact sheet is designed to provide guidance to applicants on incorporating environmental justice screening requirements pursuant to House Bill 1200, effective October 1, 2022.

What is Environmental Justice?

The concept behind the term environmental justice (EJ) is that regardless of race, color, national origin, or income, all Maryland residents and communities should have an equal opportunity to enjoy an enhanced quality of life. How to assess whether equal protection is being applied is the challenge.

Communities surrounded by a disproportionate number of polluting facilities puts residents at a higher risk for health problems from environmental exposures. It is important that residents who may be adversely affected by a proposed source be aware of the current environmental issues in their community in order to have meaningful involvement in the permitting process. Resources may be available from government and private entities to ensure that community health is not negatively impacted by a new source located in the community.

Extensive research has documented that health disparities exist between demographic groups in the United States, such as differences in mortality and morbidity associated with factors that include race/ethnicity, income, and educational attainment. House Bill 1200 adds to MDE's work incorporating diversity, equity and inclusion into our mission to help overburdened and underserved communities with environmental issues.

What is House Bill 1200 and what does it require?

Effective October 1, 2022, House Bill 1200 requires a person applying for a permit from the Department under §1-601 of the Environment Article of the Annotated Code of Maryland or any permit requiring public notice and participation to include in the application an EJ Score for the census tract where the applicant is seeking the permit; requiring the Department, on receiving a certain permit application to review the EJ Score; and requiring notices to include information related to EJ Scores and generally relating to environmental permits and environmental justice screenings.

What is a "Maryland EJ Tool"?

The term "Maryland EJ Tool" means a publicly available state mapping tool that allows users to: (1) explore layers of environmental justice concern; (2) determine an overall EJ score for census tracts in the state; and (3) view additional context layers relevant to an area. The MDE EJ Screening Tool is considered a Maryland EJ Tool.

What is an "EJ Score"?

The term "EJ Score" means an overall evaluation of an area's environment and environmental justice indicators, as defined by MDE in regulation, including: (1) pollution burden exposure; (2) pollution burden environmental effects; (3) sensitive populations; and (4) socioeconomic factors.

The MDE EJ Screening Tool considers three demographic indicators, minority population above 50%, poverty rate above 25% and limited English proficiency above 15%, to identify underserved communities, and multiple environmental health indicators to identify overburdened communities. The tool uses these indicators to calculate a

Final EJ Score Percentile, statewide. It is that score, linked to the census tract where the project is to be located, that needs to be reported to MDE as part of your permit application.

What does the application require?

The link for the MDE EJ Screening Tool is located on the Department's website, www.mde.maryland.gov. Click on the Environmental Justice header at the top of the Department's home page, then select EJ Screening Tool from the menu on the left. Click on Launch the EJ Screening Tool. After you open the tool, click okay on the opening screen. At the top right, please click the first button for the MDE Screening Report. Input the address of the proposed installation in the address bar. Click on the Report button. Once the report has been generated select the print icon and save it in a .pdf format.

The applicant needs to include the MDE Screening Report with the EJ Score from the MDE EJ Screening Tool as part of the permit application upon submission. An application will not be considered complete without the report.

The applicant is encouraged to provide the Department with a discussion about the environmental exposures in the community. This will provide pertinent information about how the applicant should proceed with engaging with the community. Residents of a community with a high indicator score and a high degree of environmental exposure should be afforded broader opportunities to participate in the permit process and understand the impacts a project seeking permit approval may have on them.

Questions

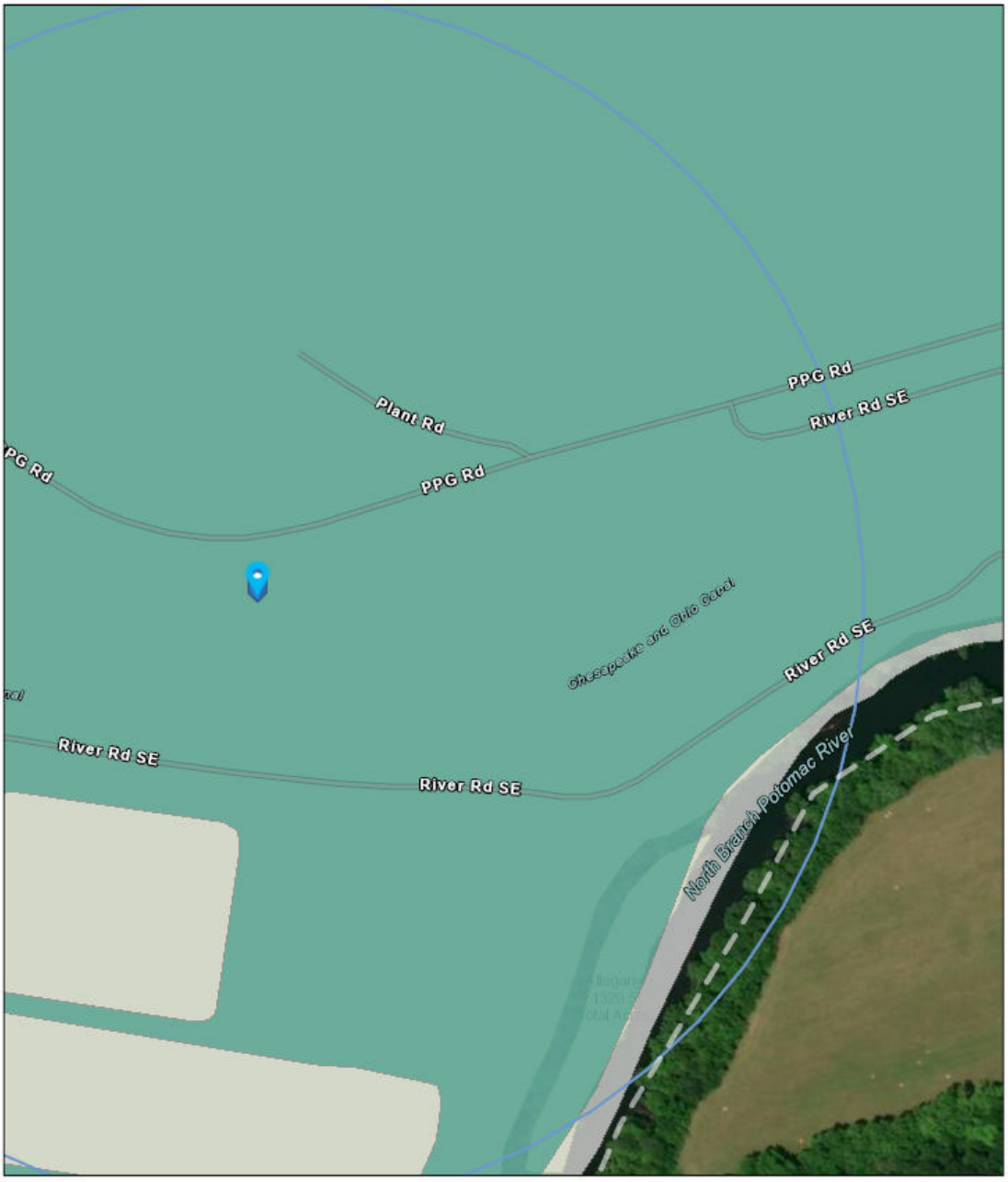
For air quality permits, please call 410-537-3230.
For water permits, please call 410-537-4145.
For land permits pertaining to Solid Waste, please call 410-537-3098. For land permits pertaining to Oil Control, please call 410-537-3483.
For land permits pertaining to Animal Feeding Operations, please call 410-537-4423.
For land permits pertaining to Biosolids, please call 410-537-3403.

Allegany Biochar, LLC_MDE Screening Report

Area of Interest (AOI) Information

Area : 0.2 mi²

Jan 3 2024 10:49:25 Eastern Standard Time



1:4,514

0 0.03 0.06 0.11 mi

0 0.04 0.09 0.18 km

MDE Final EJ Score (%ile score)

- 0% - 24.9th %ile
- 25% - 49.9th %ile
- 50% - 74.9th %ile
- 75% - 100th %ile

Air Emissions Facilities

- Resource Extraction; Utilities; Construction
- Manufacturing
- Wholesalers; Transportation and Warehousing
- Professional, Scientific, and Technical Services

MDE, OS, OIMT, ARA, MDE, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, MDE, LMA, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Summary

Name	Count	Area(mi²)	Length(mi)
MDE Final EJ Score (%ile score)	1	0.16	N/A
Overburdened Communities Combined Score	1	0.16	N/A
Overburdened Pollution Environmental Score (%ile score)	1	0.19	N/A
Overburdened Exposure Score (%ile score)	1	0.19	N/A
Overburdened Sensitive Population (%ile score)	1	0.19	N/A
Socioeconomic/Demographic Score 2020 (Percentile score) (Underserved Community)	1	0.16	N/A
Air Emissions Facilities	0	N/A	N/A
Sulfur Dioxide (2010)	0	0	N/A
Ozone (2015)	1	0.19	N/A
Fine Particles (2012)	1	0.19	N/A
Biosolids FY 2020 and Current Permit Details	0	N/A	N/A
Biosolids FY2010 - 2014 Permit Details	0	N/A	N/A
Biosolids FY2009 Expired Permit Details	0	N/A	N/A
Biosolids FY 2020 and Current Permits Distribution By Acreage	1	0.19	N/A
Biosolids FY2015 - 2019 Permits Distribution By Acreage	1	0.19	N/A
Biosolids FY2010 - 2014 Permits Distribution By Acreage	1	0.19	N/A
Biosolids FY2009 Permits Expired Distribution By Acreage	1	0.19	N/A
Biosolids FY 2020 and Current Permit Distribution By Percent Coverage	1	0.19	N/A
Biosolids FY2015 - 2019 Permit Distribution By Percent Coverage	1	0.19	N/A
Biosolids FY2010 - 2014 Permit Distribution By Percent Coverage	1	0.19	N/A
Biosolids FY2009 Expired Permit Distribution By Percent Coverage	1	0.19	N/A
Concentrated Animal Feeding Operations (CAFOs)	0	N/A	N/A
Composting Facilities	0	N/A	N/A
Food Scrap Acceptors	0	N/A	N/A
Landfills	0	N/A	N/A
Correctional Facilities	0	N/A	N/A
Industrial Food Suppliers	0	N/A	N/A

Residential Colleges	0	N/A	N/A
Non-Residential Colleges	0	N/A	N/A
Hospitals	0	N/A	N/A
High Schools	0	N/A	N/A
Grocery Stores	0	N/A	N/A
10 Miles from Landfill	2	0.39	N/A
10 Miles from Composting Facility	1	0.20	N/A
General Composting Facilities Tier 2 (MD)	0	N/A	N/A
Commercial Anaerobic Digester (MD)	0	N/A	N/A
Out of State Facilities	0	N/A	N/A
30 mile buffer (Maryland)	0	0	N/A
30 Mile Buffer (Out of State)	0	0	N/A
Land Restoration Facilities	0	N/A	N/A
Determinations (points)	0	N/A	N/A
Determinations (areas)	1	0.06	N/A
Entities	0	N/A	N/A
Active Coal Mine Sites	0	N/A	N/A
Historic Mine Facilities	0	N/A	N/A
All Permitted Solid Waste Acceptance Facilities	0	N/A	N/A
Municipal Solid Waste Acceptance Facilities	0	N/A	N/A
Maryland Dam Locations	0	N/A	N/A
Maryland Pond Locations	0	N/A	N/A
Surface Water Intakes	0	N/A	N/A
Wastewater Discharge Facilities	0	N/A	N/A
Drinking Water	0	N/A	N/A
Clean Water	0	N/A	N/A

MDE Final EJ Score (%ile score)

#	Census tract identifier	Geographic Area Name	Total Population	Final EJ Score Percent (for this tract)	Final EJ Score Percentile (Distribution across Maryland)	Area(mi²)
1	24001000200	Census Tract 2, Allegany County, Maryland	3836	31.36	60.22	0.16

Overburdened Communities Combined Score

#	GEOID20	Geographic_Area_Name	TotalPop	Overburd_Exposure_Percent	Overburd_Exposure_Percentile
1	24001000200	Census Tract 2, Allegany County, Maryland	3,836	37.08	6.15

#	Overburd_Poll_Enviro_Percent	Overburd_Poll_Enviro_Percentile	Sensitive_Population_Percent	Sensitive_Population_Percentile	OverburdenedAllPercent	OverburdenedAllPercentile	Area(mi²)
1	13.53	78.26	64.18	59.19	69.86	78.61	0.16

Overburdened Pollution Environmental Score (%ile score)

#	GEOID20	Geographic_Area_Name	RentalsOccupiedPre79Percent	Percentile	PercentRMP
1	24001000200	Census Tract 2, Allegany County, Maryland	10.28	36.91	9.33

#	PercentRMPEJ	PercentHazWaste	PercentHazWasteEJ	PercentSuperFundNPL	PercentSuperFundNPLEJ
1	24.49	0.69	11.21	17.37	35.28

#	PercentHazWW	PercentHazWWEJ	BrownFPercent	Percentile_1	PercentPowerPlants
1	65.46	68.44	0.42	93.44	18.18

#	Percentile_12	PercentCAFOS	Percentile_12_13	PercentActiveMines	Percentile_12_13_14
1	99.32	0.00	0.00	0.00	0.00

#	PollutionEnvironmentalPercent	PollnEnvironmentalPercentile	Area(mi²)
1	13.53	78.26	0.19

Overburdened Exposure Score (%ile score)

#	GEOID20	Geographic_Area_Name	Total_Pop	PercentNATA_Cancer	Percentile_NATA_Cancer
1	24001000200	Census Tract 2, Allegany County, Maryland	3,836.00	40.00	12.45

#	PercentNATA_Resp_HI	Percentile_NATA_Resp_HI	PercentNATA_Diesel	Percentile_NATA_Diesel	PercentNATA_PM25
1	60.00	20.70	13.06	9.59	78.46

#	PercentileNATA_PM25	PercentOzone	PercentileOzone	PercentTraffic	PercentileTraffic
1	7.88	83.67	11.30	0.40	6.52

#	PercentTRI	PercentileTRI	PercentHazWasteLF	Percentile_HazWasteLF	PollutionExposurePercent	PollutionExposurePercentile	Area(mi²)
1	21.05	97.20	0.00	0.00	37.08	6.15	0.19

Overburdened Sensitive Population (%ile score)

#	GEOID20	Geographic_Area_Name	PerAstma	PercentileAst	PerMyo
1	24001000200	Census Tract 2, Allegany County, Maryland	80.60	74.09	83.90

#	PercentileMyo	PerLow	PercentileLow	PercentBroad	PercentileBroad
1	73.96	21.20	22.15	28.99	88.04

#	PercentSens	PercentileSens	Area(mi²)
1	53.67	64.56	0.19

Socioeconomic/Demographic Score 2020 (Percentile score) (Underserved Community)

#	Census tract identifier	Geographic Area Name	Total Population	Percent Poverty	Percent Minority
1	24001000200	Census Tract 2, Allegany County, Maryland	3,836	31.94	31.49

#	Percent Limited English Proficiency	Demographic Score (Percent for this tract)	Demographic Score (Percentile Distribution acoss Maryland)	Area(mi²)
1	0.00	21.14	46.54	0.16

Ozone (2015)

#	STATEFP10	COUNTYFP10	COUNTYNS10	GEOID10	NAME10
1	24	001	01713506	24001	Allegany

#	Ozone NAA Area	8-Hr Ozone (2015) Designation	8-HR Ozone (2015) Classification	8-Hr Ozone (2015) Status	Area(mi²)
1	*No Data*	Attainment/Unclassifiable	*No Data*	*No Data*	0.19

Fine Particles (2012)

#	STATEFP10	COUNTYFP10	COUNTYNS10	GEOID10	NAME10	PM2.5 (2012) Status	Area(mi²)
1	24	001	01713506	24001	Allegany	Attainment/Unclassifiable	0.19

Biosolids FY 2020 and Current Permits Distribution By Acreage

#	County Name	FY2020andAfter	Area(mi²)
1	Allegany	1,329.50	0.19

Biosolids FY2015 - 2019 Permits Distribution By Acreage

#	County Name	FY2015to2019	Area(mi²)
1	Allegany	244.70	0.19

Biosolids FY2010 - 2014 Permits Distribution By Acreage

#	County Name	FY2010to2014	Area(mi²)
1	Allegany	241.00	0.19

Biosolids FY2009 Permits Expired Distribution By Acreage

#	County Name	FY2009	Area(mi²)
1	Allegany	200.30	0.19

Biosolids FY 2020 and Current Permit Distribution By Percent Coverage

#	County Name	FY2020andAfter	Area(mi²)
1	Allegany	1,329.50	0.19

Biosolids FY2015 - 2019 Permit Distribution By Percent Coverage

#	County Name	FY2015to2019	Area(mi²)
1	Allegany	244.70	0.19

Biosolids FY2010 - 2014 Permit Distribution By Percent Coverage

#	County Name	FY2010to2014	Area(mi²)
1	Allegany	241.00	0.19

Biosolids FY2009 Expired Permit Distribution By Percent Coverage

#	County Name	FY2009	Area(mi²)
1	Allegany	200.30	0.19

10 Miles from Landfill

#	County	Type	Facility_N	ADDRESS	FILL
1	ALLEGANY	WMF	Mountainview MunicipalLF	13300 New George's Creek Rd, Frostburg MD 21532.	40
2	ALLEGANY	WPT	Western MarylandPF&TS	13810 Hazmat Drive, Cumberland MD 21502.	-

#	SITE__ACRE	AI_No_	Owner_Type	MD_GRID__E	PERMITNUMB	EXPIRATION	Area(mi²)
1	396.00	19,953.00	PRI	261 /654	2011-WMF-0010	4/12/2016, 8:00 PM	0.20
2	5.85	63,586.00	PRI	801 /710	2014-WPT-0632	10/29/2019, 8:00 PM	0.20

10 Miles from Composting Facility

#	County	Facility	Address	Accepts_Fo	Location_o	Area(mi²)
1	*No Data*	Allegany County Compost Site	11700 Pittsburgh PLate Glass Road, Cumberland, MD 21502	No	11700 Pittsburgh Plate Glass Rd, Cumberland, MD 21502	0.20

Determinations (areas)

#	Site Name	Entity receiving the determination from the LRP.	Issue Date	Type of determination issued: NFA (No Further Action), NFRD (No Further Requirements Determination), or COC (Certificate of Completion)	Last inspection date
1	Former PPG - Works No. 7 (Pittsburg Plate Glass)	Allegany County Commissioners	2/14/2002, 7:00 PM	NFRD	4/30/2017, 8:00 PM

#	Indicates whether the determination includes an environmental covenant (EC)	Property has Unrestricted residential use	Property has Restricted residential use	Area(mi²)
1	No	No	No	0.06

December 7, 2023

Ms. Suna Yi Sariscak, Manager
Air Quality Permit Program
Air & Radiation Administration
Maryland Department of Environment
1800 Washington Boulevard, STE 720
Baltimore, MD 21230-1720

RE: Permit to Construct Application
Allegany Biochar, LLC, Allegany County, Maryland
EA Project No. 1641701

Dear Ms. Sariscak,

EA Engineering, Science, and Technology, Inc., PBC (EA) is pleased to submit the Permit to Construct Application for a Biochar Processing Facility in Allegany County, Maryland on behalf of Allegany Biochar, LLC.

Allegany Biochar, LLC is proposing to construct a biochar production facility at 11600 Pittsburgh Plate Glass Road SE in Allegany County, Maryland. This Project is nicknamed "Project Mule" in honor of the animals that were critical to the success of the C&O Canal that adjoins the site. Project Mule will generate approximately 6,000 tons of charcoal (biochar) per year from a mixture of approximately 10,000 tons of green wood waste (60% dry) and 26,000 wet (25% total solids) tons of biosolids per year.

The biosolids would be charred such that the material is sterilized and any "forever chemicals" (PFAS) are neutralized (reduced to carbon & minerals) by the high temperature. The char will contain nutrient value (phosphate and potassium), adding value to the blended biosolids/wood-biochar. The physical biochar will be used off-site for application to agricultural lands under U.S. Department of Agriculture Conservation Reserve Program or the Environmental Quality Incentives Program reimbursement as a soil carbon additive. The project aims to achieve a carbon-negative status in terms of CO2 emissions through the application of biochar to agricultural land and soils. The resulting negative CO2 emissions will be quantified, documented, and translated into certified carbon credits, contributing to an improved economic outlook for the project.

The application would add new process equipment including:

- two (2) biosolids belt dryers (Stela BTL1-3000-18)
- two (2) biosolids pyreg reactors (PX1500) and one (1) flameless oxidation chamber
- two (2) wood belt dryers (Stela BTL1-3000-6)
- two (2) wood pyreg reactors (PX1500) and one (1) flameless oxidation chamber

Pursuant to the requirements of COMAR 26.11.02.11 we are herewith submitting, a Permit-to-Construct Application for the biochar project. This application package includes:

- Regulatory Applicability Analysis
- Application forms
    - Four (4) Form 5s
    - One (1) Form 5T
    - Four (4) Form 5EPs, and
    - Seven (7) Form 6s.

- Emissions calculations
- General Location Map
- Process Flow Diagram
- Vendor Specifications
- Workman's Compensation Insurance (TBD)

If you have any questions or comments, or need further information, please feel free to contact me at ssultana@eaest.com or by phone at 541-286-8552.

Respectfully yours,
EA Engineering, Science, and Technology, Inc., PBC
Sharmin Sultana, P.E.
Project Engineer

Regulatory Applicability Analysis

Biochar Production & Carbon Credits
Project Mule Allegany County
Permit to Construct Application

Prepared for
Allegany Biochar, LLC
22 S Main St., Suite 400
Greenville, SC 29601

Submitted to
Maryland Department of the Environment
Air and Radiation Management Administration
1800 Washington Boulevard
Baltimore, Maryland 21230-1718

Prepared by
EA Engineering, Science, and Technology, Inc., PBC.
225 Schilling Circle
Hunt Valley, Maryland 21031

December 2023

CONTENTS

Section I

Introduction

I. Introduction

Allegany Biochar, LLC is proposing to construct a biochar production facility in Cumberland, Allegany County, Maryland. This Project is "Project Mule" in honor of the animals that were critical to the success of the C&O Canal that adjoins the site.

Project Mule will generate approximately 6,000 tons annually of charcoal called "biochar" from a mixture of approximately 10,000 tons of green wood waste (avg. 60% dry) annually and 26,000 wet cake (avg. 25% TS) tons of biosolids annually. The site is currently a wood collection center for community residents for disposal of waste wood from land clearing, storm damage clean-up, and other residential yard waste. The wood that is currently delivered to the site by the community will be supplemented with wood from area tree service firms. The dewatered biosolids feedstock will be sourced from regional wastewater treatment plants, including Allegany County, City of Cumberland, Cities of Hagerstown MD and Mineral WV, and Alcosan (Pittsburgh PA). The biosolids would be charred such that the material is sterilized and any "forever chemicals" (PFAS) are neutralized (reduced to carbon & minerals) by the high temperature. The char will contain nutrient value (phosphate and potassium), adding value to the blended biosolids/wood-biochar. The physical biochar will be used off-site for application to agricultural lands under U.S. Department of Agriculture Conservation Reserve Program or the Environmental Quality Incentives Program reimbursement as a soil carbon additive. The project aims to achieve a carbon-negative status in terms of CO2 emissions through the application of biochar to agricultural land and soils. The resulting negative CO2 emissions will be quantified, documented, and translated into certified carbon credits, contributing to an improved economic outlook for the project.

Project Description

The process is outlined in the attached Process Flow Diagram (PFD). The process begins at the site by receipt of wood in an existing wood yard currently managed by the County Department of Public Works. The major process equipment will include dryers for wood and biosolids, followed by PYREG pyrolysis units. Gas cleaning equipment will be provided for both the dryers and the pyrolysis units.

The potential to emit (PTE) criteria air pollutants (CAPs) and hazardous air pollutants (HAPs) from the proposed facility will be below the major source thresholds of the New Source Review preconstruction permitting program and the Title V operating permit program as shown in Table 1 below. The proposed facility will be a natural minor source and will not be subject to either of these permit programs. I will require a minor NSR preconstruction permit from the Maryland Department of the Environment.

A. Regulatory Applicability Analysis

The proposed biochar facility is subject to federal and state air regulations. This section summarizes the air permitting requirements and the key air quality regulations that apply to the proposed facility. Applicability of Prevention of Significant Deterioration (PSD), New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP) and COMAR Regulations are discussed in this section.

1. New Source Review (NSR)

   The federal New Source Review (NSR) program is comprised of two distinct pre-construction permitting programs: 1) Prevention of Significant Deterioration (PSD) for attainment pollutants; and 2) Nonattainment New Source Review (NNSR) for nonattainment pollutants.

   PSD permitting may apply to facilities located in attainment areas for CAPs. Projects that are either new major stationary sources or modifications to existing major sources resulting in a significant emission increase and a significant net emission increase of an attainment pollutant are subject to the PSD permitting program.

   NNSR permitting may apply to facilities located in areas that are designated in Title 40 of the Code of Federal Regulations Part 81 (40 CFR 81) as not in attainment with the National Ambient Air Quality Standard (NAAQS) for a specific criteria pollutant (i.e., areas referred to as nonattainment areas). Projects that are either new major stationary sources or modifications to existing major sources resulting with a significant emission increase and a significant net emission increase of a nonattainment pollutant are regulated under the NNSR program.

   NAAQS Attainment Status – The biochar facility is located in Allegany County, Maryland, which is designated as attainment for all CAPs. Therefore, all criteria pollutants are regulated under the PSD program for this project.

   Prevention of Significant Deterioration (PSD) – The PSD program regulates emissions from "major" stationary sources of regulated pollutants (i.e., criteria pollutants). As defined in 40 CFR 51.166, a stationary source is considered PSD major if the facility belongs to one of the 28 named source categories in 40 CFR 51.166(b)(l)(iii) and has the potential to emit 100 tpy of any pollutant subject to the regulations; or the facility has the potential to emit 250 tpy or more of any pollutant subject to the regulations, regardless of its source category.

   The biochar facility is not in one of the 28 named source categories, and potential emissions from the proposed facility, excluding fugitive emissions are less than the 250 tpy major source threshold. Therefore, the facility is a minor source with respect to the PSD permitting regulations.

Minor NSR program – The minor NSR program applies to a new minor source and/or a minor modification at both major and minor sources, in both attainment and nonattainment areas. Minor NSR may apply to criteria pollutants as well as other pollutants depending on the state. The program requirements include:

- New sources or modifications at existing sources must comply with any emissions control measures required by the state.
- The program must not interfere with attainment or maintenance of the National Ambient Air Quality Standards or the control strategies of a State Implementation Plan (SIP) or Tribal Implementation Plan (TIP).
    - An implementation plan is a set of programs and regulations developed by the appropriate regulatory agency in order to assure that the NAAQS are attained and maintained

The annual PTE for CAPs and HAPs from the proposed biochar project are shown in Table 1. Detailed emission calculations of all emission units under the proposed project are presented in Section III.

Table 1 – Project Mule PTE Summary

Emissions (units)	POLLUTANTS						
	NO_X	VOC	CO	SO_2	$PM_{10}/PM_{2.5}$	CO_{2e}	Total HAPs
ton/yr	16.91	6.62	16.17	3.69	1.10	166.98	4.99
lb/hr	3.91	1.53	3.74	0.85	0.25	38.65	1.15

As shown in Table 1, CAP and HAP PTEs are below major source thresholds.

Title V – Part 70 Program

As shown in Table 1 above, the proposed facility will be a natural minor source of CAPs and HAPs and therefore not subject to the Title V – Part 70 operating permit program.

The biochar facility will be an area (non-major) source of HAPs. The projected HAPs emissions from the proposed project is also below the major source thresholds for HAPs (10 tpy of any one HAP and 25 tpy of two or more HAPs). The HAP PTE of the project will also not exceed the HAP major source thresholds, so the facility will remain an area source of HAPs. Refer to emissions calculations in the Supporting Documentation in Section III.

2. New Source Performance Standards (NSPS)

NSPS Subpart A—General Provisions – Per 40 CFR 60 NSPS Subpart A applies to any source subject to a source-specific NSPS. Unless excluded by the source-specific NSPS, the provisions of this part apply to the owner or operator of any stationary source which contains an affected facility, the construction or modification of which is commenced after the date of publication in this part of any standard (or, if earlier, the date of publication of any proposed standard).

Subpart AAAA—Standards of Performance for Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999 or for Which Modification or Reconstruction is Commenced After June 6, 2001

This subpart establishes new source performance standards for new small municipal waste combustion units. Subpart AAAA applies if the municipal waste combustion unit meets two criteria:

(a) Your municipal waste combustion unit is a new municipal waste combustion unit.

(b) Your municipal waste combustion unit has the capacity to combust at least 35 tons per day but no more than 250 tons per day of municipal solid waste or refuse-derived fuel.

NSPS Subpart CCCC and DDDD— Standards of Performance for New Sewage Sludge Incineration Units and Emission Guidelines NSPS Subpart CCCC establishes new source performance standards for commercial and industrial solid waste incineration units (CISWIs) and air curtain incinerators (ACIs). This subpart can be implemented and enforced by the U.S. Environmental Protection Agency (EPA), or a delegated authority such as the state, local, or tribal agency. Subpart CCCC applies if the incineration unit commenced construction after June 4, 2010 or modification or reconstruction commenced after August 7, 2013.

Subpart DDDD applies to units not covered by Subpart CCCC that com bust solid waste as defined in 40 CFR 60.2875.

With this application, the biochar facility is proposing to generate biochar from wood waste and biosolids through pyrolysis. Pyrolysis is the chemical decomposition of condensed substances by heating that occurs spontaneously at high enough temperatures or a chemical change or degradation of material brought about by the action of heat. By comparison, combustion or burning is the sequence of exothermic chemical reactions between a fuel and the emission guidelines in Subpart DODD apply to commercial and industrial solid waste incineration (CISWI) units.

The facility does not consider the kilns used for pyrolysis of the wood waste and biosolids as incinerators since pyrolysis does not involve combustion of the feedstocks. Furthermore, utilizing a wood feedstock for the production of charcoal is included in the definition of a chemical recovery unit provided in 40 CFR 60.2265. Chemical recovery units are not incinerators. For these reasons, the proposed facility is not subject to NSPS Subpart CCCC.

The afterburners are not subject to NSPS Subpart CCCC since they are control devices and therefore do not meet the definition of a CISWI unit in 60.2265.

Subpart O—Standards of Performance for Sewage Treatment Plants
§ 60.150 Applicability and designation of affected facility.

(a) The affected facility is each incinerator that combusts wastes containing more than 10 percent sewage sludge (dry basis) produced by municipal sewage treatment plants, or each

incinerator that charges more than 1000 kg (2205 lb) per day municipal sewage sludge (dry basis).

(b) Any facility under paragraph (a) of this section that commences construction or modification after June 11, 1973, is subject to the requirements of this subpart

Since the facility will utilize a pyrolysis process, Subpart O for incinerators will not be applicable to this facility.

NSPS Subpart LLL and MMMM— Standards of Performance for New Sewage Sludge Incineration Units and Emission Guidelines NSPS Subpart LLL and the emission guidelines in Subpart MMMM apply to control the emissions from sewage sludge incineration units. Since the facility does not consider the kilns used for pyrolysis of the wood waste and biosolids as incinerators, the proposed facility is not subject to NSPS Subpart LLL and MMMM.

3. National Emissions Standards for Hazardous Air Pollutants (NESHAP)

National Emission Standards for Hazardous Air Pollutants (NESHAP) are stationary source standards for HAPs. Sources subject to NESHAPs are required to perform an initial performance test to demonstrate compliance. To demonstrate continuous compliance, sources are generally required to monitor control device operating parameters which are established during the initial performance test. Sources may also be required to install and operate continuous emission monitors to demonstrate compliance. Consistent with EPA's Clean Air Act Stationary Source Compliance Monitoring Strategy, NESHAP sources that meet the Clean Air Act definition of "major source" generally receive a full compliance evaluation by the state or regional office at least once every two years.

Part 63 Subpart A—General Provisions
The provisions of Subpart A apply to the owner or operator of any stationary source that emits or has the potential to emit any hazardous air pollutant listed in or pursuant to section 112(b) of the Act and is subject to any standard, limitation, prohibition, or other federally enforceable requirement established pursuant to this part. If a relevant standard has been established under this part, the owner or operator of an affected source may be required to obtain a title V permit from a permitting authority in the State in which the source is located.

Part 63 Subpart JJJJJJ—National Emissions Standards for Hazardous Air Pollutants for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers at Area Source – Per 40 CFR 63.11193, the two dryers and pyreg units are not subject to this subpart as they are not considered institutional boilers by definition.

4. Maryland State Regulations

The emissions units associated with the proposed retrofit project are subject to the following rules. This facility is also subject to all applicable State-only enforceable air pollution control requirements including, but not limited to the following regulations:

- COMAR 26.11.02 – Permits, Approvals, and Registrations
- COMAR 26.11.03 – Permits, Approvals, and Registrations – Title V Permits
- COMAR 26.11.09 (Control of Fuel-Burning Equipment, Stationary Internal Combustion Engines, and Certain Fuel-Burning Installations).
- COMAR 26.11.09.05 – Visible Emissions
- COMAR 26.11.09.06 – Control of Particulate Matter
- COMAR 26.11.09.07 – Control of Sulfur Oxides from Fuel Burning Equipment
- COMAR 26.11.09.08 – Control of NOx for Major Stationary Sources
- COMAR 26.11.15 – Toxic Air Pollutants

Section II

Application Forms

A. Cover Sheet and Checklist

AIR QUALITY PERMIT TO CONSTRUCT APPLICATION CHECKLIST

OWNER OF EQUIPMENT/PROCESS	
COMPANY NAME:	Allegany Biochar, LLC
COMPANY ADDRESS:	22 S Main St., Suite 400, Greenville, SC 29601
LOCATION OF EQUIPMENT/PROCESS	
PREMISES NAME:	Project Mule Biochar
PREMISES ADDRESS:	11600 Pittsburgh Plate Glass Road SE, Cumberland, MD 21502
CONTACT INFORMATION FOR THIS PERMIT APPLICATION	
CONTACT NAME:	Ted Niblock
JOB TITLE:	Vice President
PHONE NUMBER:	540-230-2690
EMAIL ADDRESS:	ted.niblock@nexuspmg.com
DESCRIPTION OF EQUIPMENT OR PROCESS	
Project Mule will generate 6,000 tons of biochar annually using a pyrolysis process.	

Application is hereby made to the Department of the Environment for a Permit to Construct for the following equipment or process as required by the State of Maryland Air Quality Regulation, COMAR 26.11.02.09.

Check each item that you have submitted as part of your application package.

☒ Application package cover letter describing the proposed project

☒ Complete application forms (Note the number of forms included or NA if not applicable.)

No. 4 Form 5
No. 1 Form 5T
No. 4 Form 5EP
No. 7 Form 6
No. NA Form 10
No. NA Form 11
No. NA Form 41
No. NA Form 42
No. NA Form 44

☒ Vendor/manufacturer specifications/guarantees

☒ Evidence of Workman's Compensation Insurance

☒ Process flow diagrams with emission points

☒ Site plan including the location of the proposed source and property boundary

☒ Material balance data and all emissions calculations

☐ Material Safety Data Sheets (MSDS) or equivalent information for materials processed and manufactured.

☐ Certificate of Public Convenience and Necessity (CPCN) waiver documentation from the Public Service Commission (1)

☐ Documentation that the proposed installation complies with local zoning and land use requirements (2)

(1) Required for emergency and non-emergency generators installed on or after October 1, 2001 and rated at 2001 kW or more.

(2) Required for applications subject to Expanded Public Participation Requirements.

B. Permit to Construct Applications

Processing/Manufacturing Equipment (Form 5)

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration ▪ Air Quality Permits Program
1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪ 1-800-633-6101 ▪ www.mde.state.md.us

APPLICATION FOR FUEL BURNING EQUIPMENT

Information Regarding Public Outreach

For Air Quality Permit to Construct applications subject to public review, applicants should consider the following information in the initial stages of preparing a permit application.

If you are not sure at the time you are applying for a permit whether public review of your application is required or for information on steps you can take to engage the surrounding community where your planned project will be located, please contact the Air Quality Permits Program at 410-537-3225 and seek their advice.

Communicating and engaging the local community as early as possible in your planning and development process is an important aspect of your project and should be considered a priority. Environmental Justice or "EJ" is a movement to inform, involve, and engage communities impacted by potential and planned environmental projects by affording citizens opportunities to learn about projects and discuss any concerns regarding impacts.

Although some permit applications are subject to a formal public review process prescribed by statute, the Department strongly encourages you to engage neighboring communities separate from and well ahead of the formal permitting process. Sharing your plans by way of community meetings, informational outreach at local gatherings or through local faith-based organizations can initiate a rewarding and productive dialogue that will reduce anxiety and establish a permanent link with your neighbors in the community.

All parties benefit when there is good communication. The Department can assist applicants in developing an outreach plan that fits the needs of both the company and the public.

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Blvd ▪ Baltimore, Maryland 21230
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Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PROCESSING/MANUFACTURING EQUIPMENT

Permit to Construct ☒ Registration Update ❑ Initial Registration ❑

1A. Owner of Equipment/Company Name
Allegany Biochar, LLC

Mailing Address
22 S Main St., Suite 400
Street Address

Greenville | SC | 29601
City | State | Zip

Telephone Number
(540) 230-2690

Signature

Ted Niblock, Vice President | 12/13/23
Print Name and Title | Date

DO NOT WRITE IN THIS BLOCK
2. REGISTRATION NUMBER

County No. (1-2) | Premises No. (3-6)
Registration Class (7) | Equipment No. (8-11)
Data Year (12-13) | Application Date

1B. Equipment Location and Telephone Number (if different from above)
11600 Pittsburgh Plate Glass Road SE
Street Number and Street Name

Cumberland | MD | 21502 | (540) 230-2690
City/Town | State | Zip | Telephone Number

Project Mule Biochar
Premises Name (if different from above)

3. Status (A= New, B= Modification to Existing Equipment, C= Existing Equipment)

Status	New Construction Begun (MM/YY)	New Construction Completed (MM/YY)	Existing Initial Operation (MM/YY)
A	T B D	T B D	T B D
15	16-19	20-23	20-23

4. Describe this Equipment: **Make, Model, Features, Manufacturer (include Maximum Hourly Input Rate, etc.)**
Stela BTL1-3000-18 Belt Dryers - 2 IDENTICAL UNITS

5. Workmen's Compensation Coverage TBD
Binder/Policy Number | Expiration Date
Company
NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.

6A. Number of Pieces of Identical Equipment Units to be Registered/Permitted at this Time 2

6B. Number of Stack/Emission Points Associated with this Equipment 1 (BB on PFD)

7. Person Installing this Equipment (if different from Number 1 on Page 1)

Name_____ Title_____

Company_____

Mailing Address/Street_____

City/Town_____ State_____ Telephone (_____) _____

8. Major Activity, Product or Service of Company at this Location

Project Mule will generate approximately 6,000 tons annually of charcoal called “biochar” from a mixture of approximately 10,000 tons of green wood waste (avg. 60% dry) annually and 26,000 wet cake (avg. 25% TS) tons of biosolids annually.

9. Control Devices Associated with this Equipment

None [ ] 24-0

Simple/Multiple Cyclone	Spray/Adsorb Tower	Venturi Scrubber	Carbon Adsorber	Electrostatic Precipitator	Baghouse	Thermal/Catalytic Afterburner	Dry Scrubber
[ ]	[ ]	[1]	[ ]	[ ]	[ ]	[ ]	[ ]
24-1	24-2	24-3	24-4	24-5	24-6	24-7	24-8

Other

[1] Describe Condenser

24-9

10. Annual Fuel Consumption for this Equipment

OIL-1000 GALLONS	SULFUR %	GRADE	NATURAL GAS-1000 FT^3	LP GAS-100 GALLONS	GRADE
[ ]	[ ]	[ ]	[4 0 0]	[ ]	[ ]
26-31	32-33	34	35-41	42-45	

COAL- TONS	SULFUR %	ASH%	WOOD-TONS	MOISTURE %
[ ]	[ ]	[ ]	[ ]	[ ]
46-52	53-55	56-58	59-63	64-65

OTHER FUELS _____ (Specify Type) [ ] 66-1 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

OTHER FUEL _____ (Specify Type) [ ] 66-2 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this Equipment)

Continuous Operation	Batch Process	Hours per Batch	Batch per Week	Hours per Day	Days Per Week	Days per Year
[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
67-1	67-2	68-69		70-71	72	73-75

Seasonal Variation in Operation:

No Variation	Winter Percent	Spring Percent	Summer Percent	Fall Percent	(Total Seasons= 100%)
[X]	[ ]	[ ]	[ ]	[ ]	
76	77-78	79-80	81-82	83-84	

12. Equivalent Stack Innformation- is Exhaust through Doors, Windows, etc. Only? (Y/N) N (85)

If not, then	Height Avove Ground (FT)	Inside Diameter at Top	Exit Temperature (°F)	Exit Velocity (FT/SEC)
	3 2. 8	T B D	T B D	T B D
	86-88	89-91	92-95	96-98

NOTE:
Attach a block diagram of process/process line, indicating new equipment as reported on this form and all existing equipment, including control devices and emission points.

13. Input Materials (for this equipment only)
Is any of this data to be considered confidential? N (Y or N)

	NAME	CAS NO. (IF APPLICABLE)	INPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.	*See attached					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
TOTAL						

14. Output Materials (for this equipment)
Process/Product Stream

	NAME	CAS NO. (IF APPLICABLE)	OUTPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.	*See attached					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
TOTAL						

15. Waste Streams- Solid and Liquid

	NAME	CAS NO. (IF APPLICABLE)	OUTPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.	*See attached					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
TOTAL						

16. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day

2 x Biosolids Dryer Emissions + 40% of natural gas (cold start) emissions

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
0.99	3.05	72.11
99-104	105-110	111-116

Carbon Monoxide	Volatile Organic Compounds	PM-10
11.37	1.74	0.99
177-122	123-128	129-134

17. Total Fugitive Emissions (for this equipment only) in Pounds Per Operating Day

Not Applicable

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
135-139	140-144	145-149

Carbon Monoxide	Volatile Organic Compounds	PM-10
150-154	155-159	160-164

Method Used to Determine Emissions (1= Estimate 2= Emission Factor 3= Stack Test 4= Other)

TSP	SOX	NOX	CO	VOC	PM10
1	1	1	1	1	1
165	166	167	168	169	170

AIR AND RADIATION MANAGEMENT ADMINISTRATION USE ONLY

18. Date Rec'd. Local _____ **Date Rec'd. State** _____ **Return to Local Jurisdiction** **Date**_____ **By**_____

Reviewed by Local Jurisdiction Date_____ By_____ **Reviewed by State** Date_____ By_____

19. Inventory Date **Month/Year** (171-174) **Equipment Code** (175-177) **SCC Code** (178-185)

20. Annual Operating Rate (186-192) **Maximum Design Hourly Rate** (193-199) **Permit to Operate Month** (200-201) **Transaction Date (MM/DD/YR)** (202-207)

Staff Code (208-210) **VOC Code** (211 212) **SIP Code** (213 214) **Regulation Code** (215-218) **Confidentiality** (219)

Point Description (220-238) **Action** (239) A: Add C: Change

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪1-800-633-6101 ▪ www.mde.state.md.us
Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PROCESSING/MANUFACTURING EQUIPMENT

Permit to Construct ☒ Registration Update ❑ Initial Registration ❑

1A. Owner of Equipment/Company Name
Allegany Biochar, LLC

Mailing Address
22 S Main St., Suite 400
Street Address

Greenville | SC | 29601
City | State | Zip

Telephone Number
(540) 230-2690

Signature

Ted Niblock, Vice President
Print Name and Title

12/13/23
Date

DO NOT WRITE IN THIS BLOCK
2. REGISTRATION NUMBER

County No. (1-2) | Premises No. (3-6)
Registration Class (7) | Equipment No. (8-11)
Data Year (12-13) | Application Date

1B. Equipment Location and Telephone Number (if different from above)
11600 Pittsburgh Plate Glass Road SE
Street Number and Street Name

Cumberland | MD | 21502 | (540) 230-2690
City/Town | State | Zip | Telephone Number

Project Mule Biochar
Premises Name (if different from above)

3. Status (A= New, B= Modification to Existing Equipment, C= Existing Equipment)

Status	New Construction Begun (MM/YY)	New Construction Completed (MM/YY)	Existing Initial Operation (MM/YY)
A	T B D	T B D	T B D
15	16-19	20-23	20-23

4. Describe this Equipment: **Make, Model, Features, Manufacturer (include Maximum Hourly Input Rate, etc.)**
Biosolids: 2 x Pyreg PX1500 pyrolysis reactors and 1 x flameless oxidation chamber

5. Workmen's Compensation Coverage TBD
Binder/Policy Number | Expiration Date
Company
NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.

6A. Number of Pieces of Identical Equipment Units to be Registered/Permitted at this Time See 4. above

6B. Number of Stack/Emission Points Associated with this Equipment 1 (FB on PFD)

7. Person Installing this Equipment (if different from Number 1 on Page 1)

Name_____ Title_____

Company_____

Mailing Address/Street_____

City/Town_____ State_____ Telephone (_____) _____

8. Major Activity, Product or Service of Company at this Location

Project Mule will generate approximately 6,000 tons annually of charcoal called “biochar” from a mixture of approximately 10,000 tons of green wood waste (avg. 60% dry) annually and 26,000 wet cake (avg. 25% TS) tons of biosolids annually.

9. Control Devices Associated with this Equipment

None [ ] 24-0

Simple/Multiple Cyclone	Spray/Adsorb Tower	Venturi Scrubber	Carbon Adsorber	Electrostatic Precipitator	Baghouse	Thermal/Catalytic Afterburner	Dry Scrubber
[ ]	[ ]	[1]	[1]	[ ]	[ ]	[ ]	[ ]
24-1	24-2	24-3	24-4	24-5	24-6	24-7	24-8

Other

[ ] Describe_____

24-9

10. Annual Fuel Consumption for this Equipment

OIL-1000 GALLONS	SULFUR %	GRADE	NATURAL GAS-1000 FT^3	LP GAS-100 GALLONS	GRADE
[ ]	[ ]	[ ]	[1 0 0]	[ ]	[ ]
26-31	32-33	34	35-41	42-45	

COAL- TONS	SULFUR %	ASH%	WOOD-TONS	MOISTURE %
[ ]	[ ]	[ ]	[ ]	[ ]
46-52	53-55	56-58	59-63	64-65

OTHER FUELS _____ (Specify Type) [ ] 66-1 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

OTHER FUEL _____ (Specify Type) [ ] 66-2 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this Equipment)

Continuous Operation	Batch Process	Hours per Batch	Batch per Week	Hours per Day	Days Per Week	Days per Year
[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
67-1	67-2	68-69		70-71	72	73-75

Seasonal Variation in Operation:

No Variation	Winter Percent	Spring Percent	Summer Percent	Fall Percent	(Total Seasons= 100%)
[X]	[ ]	[ ]	[ ]	[ ]	
76	77-78	79-80	81-82	83-84	

12. Equivalent Stack Innformation- is Exhaust through Doors, Windows, etc. Only? (Y/N) N (85)

If not, then

Height Avove Ground (FT)	Inside Diameter at Top	Exit Temperature (°F)	Exit Velocity (FT/SEC)
3 2 .8	T B D	T B D	T B D
86-88	89-91	92-95	96-98

NOTE:
Attach a block diagram of process/process line, indicating new equipment as reported on this form and all existing equipment, including control devices and emission points.

13. Input Materials (for this equipment only)
Is any of this data to be considered confidential? N (Y or N)

			INPUT RATE		
NAME	CAS NO. (IF APPLICABLE)	PER HOUR	UNITS	PER YEAR	UNITS
1. *See attached					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

14. Output Materials (for this equipment)
Process/Product Stream

			OUTPUT RATE		
NAME	CAS NO. (IF APPLICABLE)	PER HOUR	UNITS	PER YEAR	UNITS
1. *See attached					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

15. Waste Streams- Solid and Liquid

			OUTPUT RATE		
NAME	CAS NO. (IF APPLICABLE)	PER HOUR	UNITS	PER YEAR	UNITS
1. *See attached					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

16. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day

2 x Biosolids Pyrolysis Emissions + 10 % of natural gas (cold start) emissions

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
2.05	8.64	1.01
99-104	105-110	111-116

Carbon Monoxide	Volatile Organic Compounds	PM-10
66.61	33.29	2.05
177-122	123-128	129-134

17. Total Fugitive Emissions (for this equipment only) in Pounds Per Operating Day

Not applicable

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
135-139	140-144	145-149

Carbon Monoxide	Volatile Organic Compounds	PM-10
150-154	155-159	160-164

Method Used to Determine Emissions (1= Estimate 2= Emission Factor 3= Stack Test 4= Other)

TSP	SOX	NOX	CO	VOC	PM10
1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2
165	166	167	168	169	170

AIR AND RADIATION MANAGEMENT ADMINISTRATION USE ONLY

18. Date Rec'd. Local _____ **Date Rec'd. State** _____ **Return to Local Jurisdiction** **Date**_____ **By**_____

Reviewed by Local Jurisdiction Date_____ By_____ **Reviewed by State** Date_____ By_____

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20. Annual Operating Rate (186-192) **Maximum Design Hourly Rate** (193-199) **Permit to Operate Month** (200-201) **Transaction Date (MM/DD/YR)** (202-207)

Staff Code (208-210) **VOC Code** (211 212) **SIP Code** (213 214) **Regulation Code** (215-218) **Confidentiality** (219)

Point Description (220-238) **Action** (239) A: Add C: Change

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Street Address

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City | State | Zip

Telephone Number
(540) 230-2690

Signature

Ted Niblock, Vice President | 12/13/23
Print Name and Title | Date

DO NOT WRITE IN THIS BLOCK
2. REGISTRATION NUMBER

County No. (1-2) | Premises No. (3-6)
Registration Class (7) | Equipment No. (8-11)
Data Year (12-13) | Application Date

1B. Equipment Location and Telephone Number (if different from above)
11600 Pittsburgh Plate Glass Road SE
Street Number and Street Name

Cumberland | MD | 21502 | (540) 230-2690
City/Town | State | Zip | Telephone Number

Project Mule Biochar
Premises Name (if different from above)

3. Status (A= New, B= Modification to Existing Equipment, C= Existing Equipment)

Status	New Construction Begun (MM/YY)	New Construction Completed (MM/YY)	Existing Initial Operation (MM/YY)
A	T B D	T B D	T B D
15	16-19	20-23	20-23

4. Describe this Equipment: **Make, Model, Features, Manufacturer (include Maximum Hourly Input Rate, etc.)**
Stela BTL 1-3000-6 Belt Dryer - 2 IDENTICAL UNITS

5. Workmen's Compensation Coverage TBD
Binder/Policy Number | Expiration Date
Company

NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.

6A. Number of Pieces of Identical Equipment Units to be Registered/Permitted at this Time 2

6B. Number of Stack/Emission Points Associated with this Equipment 1 (BW on PFD)

7. Person Installing this Equipment (if different from Number 1 on Page 1)

Name_____ Title_____

Company_____

Mailing Address/Street_____

City/Town_____ State_____ Telephone (_____) _____

8. Major Activity, Product or Service of Company at this Location

Project Mule will generate approximately 6,000 tons annually of charcoal called “biochar” from a mixture of approximately 10,000 tons of green wood waste (avg. 60% dry) annually and 26,000 wet cake (avg. 25% TS) tons of biosolids annually.

9. Control Devices Associated with this Equipment

None [ ] 24-0

Simple/Multiple Cyclone	Spray/Adsorb Tower	Venturi Scrubber	Carbon Adsorber	Electrostatic Precipitator	Baghouse	Thermal/Catalytic Afterburner	Dry Scrubber
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
24-1	24-2	24-3	24-4	24-5	24-6	24-7	24-8

Other

[1] Describe Condenser

24-9

10. Annual Fuel Consumption for this Equipment

OIL-1000 GALLONS	SULFUR %	GRADE	NATURAL GAS-1000 FT^3	LP GAS-100 GALLONS	GRADE
			400		
26-31	32-33	34	35-41	42-45	

COAL- TONS	SULFUR %	ASH%	WOOD-TONS	MOISTURE %
46-52	53-55	56-58	59-63	64-65

OTHER FUELS _____ (Specify Type) [ ] 66-1 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

OTHER FUEL _____ (Specify Type) [ ] 66-2 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this Equipment)

Continuous Operation	Batch Process	Hours per Batch	Batch per Week	Hours per Day	Days Per Week	Days per Year
X						
67-1	67-2	68-69		70-71	72	73-75

Seasonal Variation in Operation:

No Variation	Winter Percent	Spring Percent	Summer Percent	Fall Percent	(Total Seasons= 100%)
X					
76	77-78	79-80	81-82	83-84	

12. Equivalent Stack Innformation- is Exhaust through Doors, Windows, etc. Only? (Y/N) N (85)

If not, then	Height Above Ground (FT)	Inside Diameter at Top	Exit Temperature (°F)	Exit Velocity (FT/SEC)
	32.8	T B D	T B D	T B D
	86-88	89-91	92-95	96-98

NOTE:
Attach a block diagram of process/process line, indicating new equipment as reported on this form and all existing equipment, including control devices and emission points.

13. Input Materials (for this equipment only)
Is any of this data to be considered confidential? N (Y or N)

	NAME	CAS NO. (IF APPLICABLE)	INPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.	*See attached					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
TOTAL						

14. Output Materials (for this equipment)
Process/Product Stream

	NAME	CAS NO. (IF APPLICABLE)	OUTPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.	*See attached					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
TOTAL						

15. Waste Streams- Solid and Liquid

	NAME	CAS NO. (IF APPLICABLE)	OUTPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.	*See attached					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
TOTAL						

16. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day

2 x Wood Dryer Emissions + 40% of natural gas (cold start) emissions

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
0.99	3.05	1.13
99-104	105-110	111-116

Carbon Monoxide	Volatile Organic Compounds	PM-10
11.37	1.74	0.99
177-122	123-128	129-134

17. Total Fugitive Emissions (for this equipment only) in Pounds Per Operating Day

Not applicable

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
135-139	140-144	145-149

Carbon Monoxide	Volatile Organic Compounds	PM-10
150-154	155-159	160-164

Method Used to Determine Emissions (1= Estimate 2= Emission Factor 3= Stack Test 4= Other)

TSP	SOX	NOX	CO	VOC	PM10
1	1	1	1	1	1
165	166	167	168	169	170

AIR AND RADIATION MANAGEMENT ADMINISTRATION USE ONLY

18. Date Rec'd. Local _____ **Date Rec'd. State** _____ **Return to Local Jurisdiction** **Date**_____ **By**_____

Reviewed by Local Jurisdiction Date_____ By_____ **Reviewed by State** Date_____ By_____

19. Inventory Date **Month/Year** (171-174) **Equipment Code** (175-177) **SCC Code** (178-185)

20. Annual Operating Rate (186-192) **Maximum Design Hourly Rate** (193-199) **Permit to Operate Month** (200-201) **Transaction Date (MM/DD/YR)** (202-207)

Staff Code (208-210) **VOC Code** (211 212) **SIP Code** (213 214) **Regulation Code** (215-218) **Confidentiality** (219)

Point Description (220-238) **Action** (239) A: Add C: Change

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪1-800-633-6101 ▪ www.mde.state.md.us
Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PROCESSING/MANUFACTURING EQUIPMENT

Permit to Construct ☒ Registration Update ❑ Initial Registration ❑

1A. Owner of Equipment/Company Name
Allegany Biochar, LLC

Mailing Address
22 S Main St., Suite 400
Street Address

Greenville | SC | 29601
City | State | Zip

Telephone Number
(540) 230-2690

Signature

Ted Niblock, Vice President
Print Name and Title

12/13/23
Date

DO NOT WRITE IN THIS BLOCK
2. REGISTRATION NUMBER

County No. (1-2) | Premises No. (3-6)
Registration Class (7) | Equipment No. (8-11)
Data Year (12-13) | Application Date

1B. Equipment Location and Telephone Number (if different from above)
11600 Pittsburgh Plate Glass Road SE
Street Number and Street Name

Cumberland | MD | 21502 | (540) 230-2690
City/Town | State | Zip | Telephone Number

Project Mule Biochar
Premises Name (if different from above)

3. Status (A= New, B= Modification to Existing Equipment, C= Existing Equipment)

Status	New Construction Begun (MM/YY)	New Construction Completed (MM/YY)	Existing Initial Operation (MM/YY)
A	T B D	T B D	T B D
15	16-19	20-23	20-23

4. Describe this Equipment: Make, Model, Features, Manufacturer (include Maximum Hourly Input Rate, etc.)
Wood: 2 x Pyreg PX1500 pyrolysis reactors and 1 x flameless oxidation chamber

5. Workmen's Compensation Coverage TBD
Binder/Policy Number | Expiration Date
Company
NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.

6A. Number of Pieces of Identical Equipment Units to be Registered/Permitted at this Time See 4. above

6B. Number of Stack/Emission Points Associated with this Equipment 1 (FW on PFD)

7. Person Installing this Equipment (if different from Number 1 on Page 1)

Name_____ Title_____

Company_____

Mailing Address/Street_____

City/Town_____ State_____ Telephone (_____) _____

8. Major Activity, Product or Service of Company at this Location

Project Mule will generate approximately 6,000 tons annually of charcoal called “biochar” from a mixture of approximately 10,000 tons of green wood waste (avg. 60% dry) annually and 26,000 wet cake (avg. 25% TS) tons of biosolids annually.

9. Control Devices Associated with this Equipment

None [ ] 24-0

Simple/Multiple Cyclone	Spray/Adsorb Tower	Venturi Scrubber	Carbon Adsorber	Electrostatic Precipitator	Baghouse	Thermal/Catalytic Afterburner	Dry Scrubber
[ ]	[ ]	[1]	[1]	[ ]	[ ]	[ ]	[ ]
24-1	24-2	24-3	24-4	24-5	24-6	24-7	24-8

Other [ ] Describe_____ 24-9

10. Annual Fuel Consumption for this Equipment

OIL-1000 GALLONS	SULFUR %	GRADE	NATURAL GAS-1000 FT^3	LP GAS-100 GALLONS	GRADE
			100		
26-31	32-33	34	35-41	42-45	

COAL- TONS	SULFUR %	ASH%	WOOD-TONS	MOISTURE %
46-52	53-55	56-58	59-63	64-65

OTHER FUELS _____ (Specify Type) [ ] 66-1 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

OTHER FUEL _____ (Specify Type) [ ] 66-2 ANNUAL AMOUNT CONSUMED _____ (Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this Equipment)

Continuous Operation	Batch Process	Hours per Batch	Batch per Week	Hours per Day	Days Per Week	Days per Year
[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
67-1	67-2	68-69		70-71	72	73-75

Seasonal Variation in Operation:

No Variation	Winter Percent	Spring Percent	Summer Percent	Fall Percent	(Total Seasons= 100%)
[X]	[ ]	[ ]	[ ]	[ ]	
76	77-78	79-80	81-82	83-84	

12. Equivalent Stack Innformation- is Exhaust through Doors, Windows, etc. Only? (Y/N) N (85)

If not, then	Height Avove Ground (FT)	Inside Diameter at Top	Exit Temperature (°F)	Exit Velocity (FT/SEC)
	3 2 .8	T B D	T B D	T B D
	86-88	89-91	92-95	96-98

NOTE:
Attach a block diagram of process/process line, indicating new equipment as reported on this form and all existing equipment, including control devices and emission points.

13. Input Materials (for this equipment only)
Is any of this data to be considered confidential? N (Y or N)

			INPUT RATE		
NAME	CAS NO. (IF APPLICABLE)	PER HOUR	UNITS	PER YEAR	UNITS
1. *See attached					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

14. Output Materials (for this equipment)
Process/Product Stream

			OUTPUT RATE		
NAME	CAS NO. (IF APPLICABLE)	PER HOUR	UNITS	PER YEAR	UNITS
1. *See attached					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

15. Waste Streams- Solid and Liquid

			OUTPUT RATE		
NAME	CAS NO. (IF APPLICABLE)	PER HOUR	UNITS	PER YEAR	UNITS
1. *See attached					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

16. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day

2 x Wood Pyrolysis Emissions + 10 % of natural gas (cold start) emissions

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
2.05	5.76	19.71
99-104	105-110	111-116

Carbon Monoxide	Volatile Organic Compounds	PM-10
0.50	0.00	2.05
177-122	123-128	129-134

17. Total Fugitive Emissions (for this equipment only) in Pounds Per Operating Day

Not applicable

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
135-139	140-144	145-149

Carbon Monoxide	Volatile Organic Compounds	PM-10
150-154	155-159	160-164

Method Used to Determine Emissions (1= Estimate 2= Emission Factor 3= Stack Test 4= Other)

TSP	SOX	NOX	CO	VOC	PM10
1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2
165	166	167	168	169	170

AIR AND RADIATION MANAGEMENT ADMINISTRATION USE ONLY

18. Date Rec'd. Local _____ **Date Rec'd. State** _____ **Return to Local Jurisdiction** **Date**_____ **By**_____

Reviewed by Local Jurisdiction Date_____ By_____ **Reviewed by State** Date_____ By_____

19. Inventory Date **Month/Year** (171-174) **Equipment Code** (175-177) **SCC Code** (178-185)

20. Annual Operating Rate (186-192) **Maximum Design Hourly Rate** (193-199) **Permit to Operate Month** (200-201) **Transaction Date (MM/DD/YR)** (202-207)

Staff Code (208-210) **VOC Code** (211 212) **SIP Code** (213 214) **Regulation Code** (215-218) **Confidentiality** (219)

Point Description (220-238) **Action** (239) A: Add C: Change

Toxic Air Pollutant Emissions Summary and Compliance Demonstration (Form 5T)

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration ● Air Quality Permits Program
1800 Washington Boulevard ● Baltimore, Maryland 21230
(410)537-3225 ● 1-800-633-6101● www.mde.maryland.gov

FORM 5T: Toxic Air Pollutant (TAP) Emissions Summary and Compliance Demonstration

Applicant Name: Allegany Biochar, LLC

Step 1: Quantify premises-wide emissions of Toxic Air Pollutants (TAP) from new and existing installations in accordance with COMAR 26.11.15.04. Attach supporting documentation as necessary.

Toxic Air Pollutant (TAP)	CAS Number	Class I or Class II?	Screening Levels (µg/m^3)			Estimated Premises Wide Emissions of TAP			
						Actual Total Existing TAP Emissions	Projected TAP Emissions from Proposed Installation	Premises Wide Total TAP Emissions	
			1-hour	8-hour	Annual	(lb/hr)	(lb/hr)	(lb/hr)	(lb/yr)
ex. ethanol	*64175*	*II*	*18843*	*3769*	*N/A*	*0.60*	*0.15*	*0.75*	*1500*
ex. benzene	*71432*	*I*	*80*	*16*	*0.13*	*0.5*	*0.75*	*1.00*	*400*
*See attached									

(attach additional sheets as necessary.)

Note: Screening levels can be obtained from the Department's website (http://www.mde.maryland.gov) or by calling the Department.

Step 2: Determine which TAPs are exempt from further review. A TAP that meets either of the following Class I or Class II small quantity emitter exemptions is exempt from further TAP compliance demonstration requirements under Step 3 and Step 4.

Class II TAP Small Quantity Emitter Exemption Requirements (COMAR 26.11.15.03B(3)(a))
A Class II TAP is exempt from Step 3 and Step 4 if the Class II TAP meets the following requirements: Premises wide emissions of the TAP shall not exceed 0.5 pounds per hour, and any applicable 1-hour or 8-hour screening level for the TAP must be greater than 200 µg/m^3.

Class I TAP Small Quantity Emitter Exemption Requirements (COMAR 26.11.15.03B(3)(b))
A Class I TAP is exempt from Step 3 and Step 4 if the Class I TAP meets the following requirements: Premises wide emissions of the TAP shall not exceed 0.5 pounds per hour and 350 pounds per year, any applicable 1-hour or 8-hour screening level for the TAP must be greater than 200 µg/m^3, and any applicable annual screening level for the TAP must be greater than 1 µg/m^3.

If a TAP meets either the Class I or Class II TAP Small Quantity Emitter Exemption Requirements, no further review under Step 3 and Step 4 are required for that specific TAP.

FORM 5T: Toxic Air Pollutant (TAP) Emissions Summary and Compliance Demonstration

Step 3: Best Available Control Technology for Toxics Requirement (T-BACT, COMAR 26.11.15.05)
In the following table, list all TAP emission reduction options considered when determining T-BACT for the proposed installation. The options should be listed in order beginning with the most effective control strategy to the least effective strategy. Attach supporting documentation as necessary.

Target Pollutants	Emission Control Option	% Emission Reduction	Costs		T-BACT Option Selected? (yes/no)
			Capital	Annual Operating	
ex. ethanol and benzene	*Thermal Oxidizer*	*99*	*$50,000*	*$100,000*	*no*
ex. ethanol and benzene	*Low VOC materials*	*80*	*0*	*$100.000*	*yes*
N/A					

(attach additional sheets as necessary)

Step 4: Demonstrating Compliance with the Ambient Impact Requirement (COMAR 26.11.15.06)
Each TAP not exempt in Step 2 must be individually evaluated to determine that the emissions of the TAP will not adversely impact public health. The evaluation consists of a series of increasingly non-conservative (and increasingly rigorous) tests. Once a TAP passes a test in the evaluation, no further analysis is required for that TAP. "Demonstrating Compliance with the Ambient Impact Requirement under the Toxic Air Pollutant (TAP) Regulations (COMAR 26.11.15.06)" provides guidance on conducting the evaluation. Summarize your results in the following table. Attach supporting documentation as necessary.

Toxic Air Pollutant (TAP)	CAS Number	Screening Levels ($\mu g/m^3$)			Premises Wide Total TAP Emissions		Allowable Emissions Rate (AER) per COMAR 26.11.16.02A		Off-site Concentrations per Screening Analysis ($\mu g/m^3$)			Compliance Method Used?
		1-hour	8-hour	Annual	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	1-hour	8-hour	Annual	AER or Screen
ex. ethanol	*64175*	*18843*	*3769*	*N/A*	*0.75*	*1500*	*0.89*	*N/A*	*N/A*	*N/A*	*N/A*	*AER*
ex. benzene	*71432*	*80*	*16*	*0.13*	*1.00*	*400*	*0.04*	*36.52*	*1.5*	*1.05*	*0.12*	*Screen*
N/A												

(attach additional sheets as necessary)

If compliance with the ambient impact requirement cannot be met using the allowable emissions rate method or the screening analysis method, refined dispersion modeling techniques may be required. Please consult with the Department's Air Quality Permit Program prior to conducting dispersion modeling methods to demonstrate compliance.

Emission Point Data (Form 5EP)

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration ● Air Quality Permits Program
1800 Washington Boulevard ● Baltimore, Maryland 21230
(410)537-3225 ● 1-800-633-6101● www.mde.maryland.gov

FORM 5EP: Emission Point Data

Complete one (1) Form 5EP for EACH emission point (stack or fugitive emissions) related to the proposed installation.

Applicant Name: Allegany Biochar, LLC

1. Emission Point Identification Name/Number

List the applicant assigned name/number for this emission point and use this value on the attached required plot plan:
BB (See PFD)

2. Emission Point Description

Describe the emission point including all associated equipment and control devices:
Emissions associated with Stela belt dryer units 1 & 2. Control devices include condenser and wet scrubber.

3. Emissions Schedule for the Emission Point

Continuous or Intermittent (C/I)?	C	**Seasonal Variation** Check box if none: ☒ Otherwise estimate seasonal variation:	
Minutes per hour:	60	Winter Percent	
Hours per day:	24	Spring Percent	
Days per week:	7	Summer Percent	
Weeks per year:	52	Fall Percent	

4. Emission Point Information

Height above ground (ft):	32.8	Length and width dimensions at top of rectangular stack (ft):	Length: TBD	Width: TBD	
Height above structures (ft):	TBD				
Exit temperature (ºF):	104	Inside diameter at top of round stack (ft):		TBD	
Exit velocity (ft/min):	TBD	Distance from emission point to nearest property line (ft):		TBD	
Exhaust gas volumetric flow rate (acfm):	1350	Building dimensions if emission point is located on building (ft)	Height TBD	Length TBD	Width TBD

5. Control Devices Associated with the Emission Point

Identify each control device associated with the emission point and indicate the number of devices. ***A Form 6 is also required for each control device***. If none check none:

- ☐ None
- ☐ Baghouse No. _____
- ☐ Cyclone No. _____
- ☐ Elec. Precipitator (ESP) No. _____
- ☐ Dust Suppression System No. _____
- ☒ Venturi Scrubber No. 1
- ☐ Spray Tower/Packed Bed No. _____
- ☐ Carbon Adsorber No. _____
  - ☐ Cartridge/Canister
  - ☐ Regenerative
- ☐ Thermal Oxidizer No. _____
  - ☐ Regenerative
- ☐ Catalytic Oxidizer No. _____
- ☐ Nitrogen Oxides Reduction No. _____
  - ☐ Selective ☐ Non-Selective
  - ☐ Catalytic ☐ Non-Catalytic
- ☒ Other Specify: Condenser No. 1

FORM 5EP: Emission Point Data

6. Estimated Emissions from the Emission Point

Criteria Pollutants	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Particulate Matter (filterable as PM10)	*See attached			
Particulate Matter (filterable as PM2.5)				
Particulate Matter (condensables)				
Volatile Organic Compounds (VOC)				
Oxides of Sulfur (SOx)				
Oxides of Nitrogen (NOx)				
Carbon Monoxide (CO)				
Lead (Pb)				

Greenhouse Gases (GHG)	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Carbon Dioxide (CO_2)	*See attached			
Methane (CH_4)				
Nitrous Oxide (N_2O)				
Hydrofluorocarbons (HFCs)				
Perfluorocarbons (PFCs)				
Sulfur Hexafluoride (SF6)				
Total GHG (as CO_2e)				

List individual federal Hazardous Air Pollutants (HAP) below:	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
*See attached				

(Attach additional sheets as necessary.)

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FORM 5EP: Emission Point Data

Complete one (1) Form 5EP for EACH emission point (stack or fugitive emissions) related to the proposed installation.

Applicant Name: Allegany Biochar, LLC

1. Emission Point Identification Name/Number

List the applicant assigned name/number for this emission point and use this value on the attached required plot plan:
FB (See PFD)

2. Emission Point Description

Describe the emission point including all associated equipment and control devices:
Emissions associated with PYREG pyrolysis units 1 & 2. Also includes emissions from flameless oxidation chamber. Control devic

3. Emissions Schedule for the Emission Point

Continuous or Intermittent (C/I)?	C	**Seasonal Variation** Check box if none: ☒ Otherwise estimate seasonal variation:	
Minutes per hour:	60	Winter Percent	
Hours per day:	24	Spring Percent	
Days per week:	7	Summer Percent	
Weeks per year:	52	Fall Percent	

4. Emission Point Information

Height above ground (ft):	32.8	Length and width dimensions at top of rectangular stack (ft):	Length: TBD	Width: TBD	
Height above structures (ft):	TBD				
Exit temperature (ºF):	TBD	Inside diameter at top of round stack (ft):		TBD	
Exit velocity (ft/min):	TBD	Distance from emission point to nearest property line (ft):		TBD	
Exhaust gas volumetric flow rate (acfm):	TBD	Building dimensions if emission point is located on building (ft)	Height TBD	Length TBD	Width TBD

5. Control Devices Associated with the Emission Point

Identify each control device associated with the emission point and indicate the number of devices. ***A Form 6 is also required for each control device***. If none check none:

- ☐ None
- ☐ Baghouse No. _____
- ☐ Cyclone No. _____
- ☐ Elec. Precipitator (ESP) No. _____
- ☐ Dust Suppression System No. _____
- ☒ Venturi Scrubber No. 1
- ☐ Spray Tower/Packed Bed No. _____
- ☒ Carbon Adsorber No. 1
  - ☒ Cartridge/Canister
  - ☐ Regenerative
- ☐ Thermal Oxidizer No. _____
  - ☐ Regenerative
- ☐ Catalytic Oxidizer No. _____
- ☐ Nitrogen Oxides Reduction No. _____
  - ☐ Selective ☐ Non-Selective
  - ☐ Catalytic ☐ Non-Catalytic
- ☐ Other No. _____
  Specify:

FORM 5EP: Emission Point Data

6. Estimated Emissions from the Emission Point

Criteria Pollutants	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Particulate Matter (filterable as PM10)	*See attached			
Particulate Matter (filterable as PM2.5)				
Particulate Matter (condensables)				
Volatile Organic Compounds (VOC)				
Oxides of Sulfur (SOx)				
Oxides of Nitrogen (NOx)				
Carbon Monoxide (CO)				
Lead (Pb)				

Greenhouse Gases (GHG)	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Carbon Dioxide (CO_2)	*See attached			
Methane (CH_4)				
Nitrous Oxide (N_2O)				
Hydrofluorocarbons (HFCs)				
Perfluorocarbons (PFCs)				
Sulfur Hexafluoride (SF6)				
Total GHG (as CO_2e)				

List individual federal Hazardous Air Pollutants (HAP) below:	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
*See attached				

(Attach additional sheets as necessary.)

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FORM 5EP: Emission Point Data

Complete one (1) Form 5EP for EACH emission point (stack or fugitive emissions) related to the proposed installation.

Applicant Name: Allegany Biochar, LLC

1. Emission Point Identification Name/Number

List the applicant assigned name/number for this emission point and use this value on the attached required plot plan:
BW (See PFD)

2. Emission Point Description

Describe the emission point including all associated equipment and control devices:
Emissions associated with Stela belt dryer units 3 & 4. Control device includes a condenser.

3. Emissions Schedule for the Emission Point

Continuous or Intermittent (C/I)?	C	**Seasonal Variation** Check box if none: ☒ Otherwise estimate seasonal variation:	
Minutes per hour:	60	Winter Percent	
Hours per day:	24	Spring Percent	
Days per week:	7	Summer Percent	
Weeks per year:	52	Fall Percent	

4. Emission Point Information

Height above ground (ft):	32.8	Length and width dimensions at top of rectangular stack (ft):	Length: TBD	Width: TBD	
Height above structures (ft):	TBD				
Exit temperature (ºF):	TBD	Inside diameter at top of round stack (ft):		TBD	
Exit velocity (ft/min):	TBD	Distance from emission point to nearest property line (ft):		TBD	
Exhaust gas volumetric flow rate (acfm):	1350	Building dimensions if emission point is located on building (ft)	Height TBD	Length TBD	Width TBD

5. Control Devices Associated with the Emission Point

Identify each control device associated with the emission point and indicate the number of devices. ***A Form 6 is also required for each control device***. If none check none:

- ☐ None
- ☐ Baghouse No. _____
- ☐ Cyclone No. _____
- ☐ Elec. Precipitator (ESP) No. _____
- ☐ Dust Suppression System No. _____
- ☐ Venturi Scrubber No. _____
- ☐ Spray Tower/Packed Bed No. _____
- ☐ Carbon Adsorber No. _____
  - ☐ Cartridge/Canister
  - ☐ Regenerative
- ☐ Thermal Oxidizer No. _____
  - ☐ Regenerative
- ☐ Catalytic Oxidizer No. _____
- ☐ Nitrogen Oxides Reduction No. _____
  - ☐ Selective ☐ Non-Selective
  - ☐ Catalytic ☐ Non-Catalytic
- ☒ Other Specify: Condenser No. 1

FORM 5EP: Emission Point Data

6. Estimated Emissions from the Emission Point

Criteria Pollutants	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Particulate Matter (filterable as PM10)	*See attached			
Particulate Matter (filterable as PM2.5)				
Particulate Matter (condensables)				
Volatile Organic Compounds (VOC)				
Oxides of Sulfur (SOx)				
Oxides of Nitrogen (NOx)				
Carbon Monoxide (CO)				
Lead (Pb)				

Greenhouse Gases (GHG)	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Carbon Dioxide (CO_2)	*See attached			
Methane (CH_4)				
Nitrous Oxide (N_2O)				
Hydrofluorocarbons (HFCs)				
Perfluorocarbons (PFCs)				
Sulfur Hexafluoride (SF6)				
Total GHG (as CO_2e)				

List individual federal Hazardous Air Pollutants (HAP) below:	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
*See attached				

(Attach additional sheets as necessary.)

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration ● Air Quality Permits Program
1800 Washington Boulevard ● Baltimore, Maryland 21230
(410)537-3225 ● 1-800-633-6101● www.mde.maryland.gov

FORM 5EP: Emission Point Data

Complete one (1) Form 5EP for EACH emission point (stack or fugitive emissions) related to the proposed installation.

Applicant Name: Allegany Biochar, LLC

1. Emission Point Identification Name/Number

List the applicant assigned name/number for this emission point and use this value on the attached required plot plan:
FW (See PFD)

2. Emission Point Description

Describe the emission point including all associated equipment and control devices:
Emissions associated with PYREG pyrolysis units 3 & 4. Also includes emissions from flameless oxidation chamber. Control devic

3. Emissions Schedule for the Emission Point

Continuous or Intermittent (C/I)?	C	**Seasonal Variation** Check box if none: ☒ Otherwise estimate seasonal variation:	
Minutes per hour:	60	Winter Percent	
Hours per day:	24	Spring Percent	
Days per week:	7	Summer Percent	
Weeks per year:	52	Fall Percent	

4. Emission Point Information

Height above ground (ft):	32.8	Length and width dimensions at top of rectangular stack (ft):	Length: TBD	Width: TBD	
Height above structures (ft):	TBD				
Exit temperature (ºF):	TBD	Inside diameter at top of round stack (ft):		TBD	
Exit velocity (ft/min):	TBD	Distance from emission point to nearest property line (ft):		TBD	
Exhaust gas volumetric flow rate (acfm):	TBD	Building dimensions if emission point is located on building (ft)	Height TBD	Length TBD	Width TBD

5. Control Devices Associated with the Emission Point

Identify each control device associated with the emission point and indicate the number of devices. ***A Form 6 is also required for each control device***. If none check none:

- ☐ None
- ☐ Baghouse No. _____
- ☐ Cyclone No. _____
- ☐ Elec. Precipitator (ESP) No. _____
- ☐ Dust Suppression System No. _____
- ☒ Venturi Scrubber No. 1
- ☐ Spray Tower/Packed Bed No. _____
- ☒ Carbon Adsorber No. 1
  - ☒ Cartridge/Canister
  - ☐ Regenerative
- ☐ Thermal Oxidizer No. _____
  - ☐ Regenerative
- ☐ Catalytic Oxidizer No. _____
- ☐ Nitrogen Oxides Reduction No. _____
  - ☐ Selective ☐ Non-Selective
  - ☐ Catalytic ☐ Non-Catalytic
- ☐ Other No. _____
  Specify:

FORM 5EP: Emission Point Data

6. Estimated Emissions from the Emission Point

Criteria Pollutants	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Particulate Matter (filterable as PM10)	*See attached			
Particulate Matter (filterable as PM2.5)				
Particulate Matter (condensables)				
Volatile Organic Compounds (VOC)				
Oxides of Sulfur (SOx)				
Oxides of Nitrogen (NOx)				
Carbon Monoxide (CO)				
Lead (Pb)				

Greenhouse Gases (GHG)	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
Carbon Dioxide (CO_2)	*See attached			
Methane (CH_4)				
Nitrous Oxide (N_2O)				
Hydrofluorocarbons (HFCs)				
Perfluorocarbons (PFCs)				
Sulfur Hexafluoride (SF6)				
Total GHG (as CO_2e)				

List individual federal Hazardous Air Pollutants (HAP) below:	At Design Capacity (lb/hr)	At Projected Operations		
		(lb/hr)	(lb/day)	(ton/yr)
*See attached				

(Attach additional sheets as necessary.)

Gas Cleaning or Emission Control Equipment

(Form 6)

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PERMIT TO CONSTRUCT
GAS CLEANING OR EMISSION CONTROL EQUIPMENT

1. Owner of Installation Allegany Biochar, LLC	**Telephone No.** 540-230-2690		**Date of Application** 12/13/23
2. Mailing Address 22 S Main St., Suite 400	**City** Greenville, SC	**Zip Code** 29601	**County** Greenville
3. Equipment Location 11600 Pittsburgh Plate Glass Road SE	**City/Town or P.O.** Cumberland, MD		**County** Allegany
4. Signature of Owner or Operator	**Title** Vice President		**Print or Type Name** Ted Niblock

5. Application Type: **Alteration** ☐ **New Construction** ☑

6. Date Construction is to Start: TBD **Completion Date (Estimate):** TBD

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ **Multiple Cyclone** ☐ **Afterburner** ☐ **Electrostatic Precipitator** ☐

Scrubber ☐ _____ (type) **Other** ☒ Condenser (type)

8. Gas Cleaning Equipment Manufacturer Stela **Model No.** BTL1-3000-18 Belt Dryer - Condenser **Collection Efficiency (Design Criteria)**

9. Type of Equipment which Control Equipment is to Service:
2 x Stela BTL1-3000-18 Belt Dryers

10. Stack Test to be Conducted:

Yes ☐ **No** ☐ TBD (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment $250,000

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	1350	ACFM*	TBD	ACFM*
Gas Temperature	104	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	TBD	GRAINS/ACFD**	TBD	GRAINS/ACFD**
Moisture Content	Saturated	%	TBD	%
OR Wet Bulb Temperature	TBD	°F	TBD	°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

*= ACTUAL CUBIC FEET PER MINUTE **= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	NA	NA
10 to 44 Microns		
Larger than 44 Microns		

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat_____

Combustion Chamber_____ _____ Operating Temperature at Afterburner _____ °F
(diameter) (length)

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

*See attached

Date Received: Local _____ _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date_____

By _____

Application Returned to Applicant:

Date_____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

PREMISES NUMBER: | | | | | | | |

Emission Calculations Revised By _____ Date _____

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4. Signature of Owner or Operator	**Title** Vice President		**Print or Type Name** Ted Niblock

5. Application Type: **Alteration** ☐ **New Construction** ☑

6. Date Construction is to Start: TBD **Completion Date (Estimate):** TBD

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ **Multiple Cyclone** ☐ **Afterburner** ☐ **Electrostatic Precipitator** ☐

Scrubber ☒ Wet Scrubber (type) **Other** ☐ _____ (type)

8. Gas Cleaning Equipment Manufacturer	**Model No.**	**Collection Efficiency (Design Criteria)**
Stela	BTL1-3000-18 Belt Dryer - Wet Scrubber	

9. Type of Equipment which Control Equipment is to Service:
2 x Stela BTL1-3000-18 Belt Dryers

10. Stack Test to be Conducted:

Yes ☐ **No** ☐ TBD (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment $250,000

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	1350	ACFM*	TBD	ACFM*
Gas Temperature	104	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	TBD	GRAINS/ACFD**	TBD	GRAINS/ACFD**
Moisture Content	Saturated	%	TBD	%
OR Wet Bulb Temperature	TBD	°F	TBD	°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

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13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	100%	95%
10 to 44 Microns		
Larger than 44 Microns		

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat_____

Combustion Chamber_____ _____ Operating Temperature at Afterburner _____ °F
(diameter) (length)

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

*See attached

Date Received: Local _____ _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date_____

By _____

Application Returned to Applicant:

Date_____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

PREMISES NUMBER: | | | | | | | |

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4. Signature of Owner or Operator	**Title** Vice President		**Print or Type Name** Ted Niblock

5. Application Type: **Alteration** ☐ **New Construction** ☑

6. Date Construction is to Start: TBD **Completion Date (Estimate):** TBD

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ **Multiple Cyclone** ☐ **Afterburner** ☐ **Electrostatic Precipitator** ☐

Scrubber ☐ _____ (type) **Other** ☒ Activated Carbon Filter (type)

8. Gas Cleaning Equipment Manufacturer	**Model No.**	**Collection Efficiency (Design Criteria)**
PYREG	PX1500 - Activated Carbon Filter	

9. Type of Equipment which Control Equipment is to Service:
2 x PYREG PX1500 pyrolysis reactors and 1 x flameless oxidation chamber

10. Stack Test to be Conducted:

Yes ☐ **No** ☐ TBD (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment TBD

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	TBD	GRAINS/ACFD**	TBD	GRAINS/ACFD**
Moisture Content OR Wet Bulb Temperature	TBD	%	TBD	%
	TBD	°F	TBD	°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

*= ACTUAL CUBIC FEET PER MINUTE **= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	TBD	TBD
10 to 44 Microns		
Larger than 44 Microns		

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat_____

Combustion Chamber_____ _____ Operating Temperature at Afterburner _____ °F
(diameter) (length)

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

*See attached

Date Received: Local _____ _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

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Date_____

By _____

Application Returned to Applicant:

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REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

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Emission Calculations Revised By _____ Date _____

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4. Signature of Owner or Operator	**Title** Vice President		**Print or Type Name** Ted Niblock

5. Application Type: **Alteration** ☐ **New Construction** ☑

6. Date Construction is to Start: TBD **Completion Date (Estimate):** TBD

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ **Multiple Cyclone** ☐ **Afterburner** ☐ **Electrostatic Precipitator** ☐

Scrubber ☒ Wet Scrubber (type) **Other** ☐ _____ (type)

8. Gas Cleaning Equipment Manufacturer	**Model No.**	**Collection Efficiency (Design Criteria)**
PYREG	PX1500 - Scrubbing Tower	95 - 98%

9. Type of Equipment which Control Equipment is to Service:
2 x PYREG PX1500 pyrolysis reactors and 1 x flameless oxidation chamber

10. Stack Test to be Conducted:

Yes ☐ **No** ☐ TBD (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment $250,000

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	TBD	GRAINS/ACFD**	TBD	GRAINS/ACFD**
Moisture Content	TBD	%	TBD	%
OR Wet Bulb Temperature	TBD	°F	TBD	°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

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WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	100%	95%
10 to 44 Microns		
Larger than 44 Microns		

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat_____

Combustion Chamber_____ _____ Operating Temperature at Afterburner _____ °F
(diameter) (length)

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

*See attached

Date Received: Local _____ _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

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Date_____

By _____

Application Returned to Applicant:

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REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

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5. Application Type: **Alteration** ☐ **New Construction** ☑

6. Date Construction is to Start: TBD **Completion Date (Estimate):** TBD

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ **Multiple Cyclone** ☐ **Afterburner** ☐ **Electrostatic Precipitator** ☐

Scrubber ☐ _____ (type) **Other** ☒ Condenser (type)

8. Gas Cleaning Equipment Manufacturer Stela **Model No.** BTL 1-3000-6 Belt Dryer - Condenser **Collection Efficiency (Design Criteria)**

9. Type of Equipment which Control Equipment is to Service:
2 x Stela BTL 1-3000-6 Belt Dryers

10. Stack Test to be Conducted:

Yes ☐ **No** ☐ TBD (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment $250,000

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	1350	ACFM*	TBD	ACFM*
Gas Temperature	104	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	TBD	GRAINS/ACFD**	TBD	GRAINS/ACFD**
Moisture Content	Saturated	%	TBD	%
OR Wet Bulb Temperature	TBD	°F	TBD	°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

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13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	NA	NA
10 to 44 Microns		
Larger than 44 Microns		

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat_____

Combustion Chamber_____ _____ Operating Temperature at Afterburner _____ °F
(diameter) (length)

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

*See attached

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Local _____

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Application Returned to Applicant:

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REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

PREMISES NUMBER: | | | | | | | |

Emission Calculations Revised By _____ Date _____

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4. Signature of Owner or Operator	**Title** Vice President		**Print or Type Name** Ted Niblock

5. Application Type: **Alteration** ☐ **New Construction** ☑

6. Date Construction is to Start: TBD **Completion Date (Estimate):** TBD

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ **Multiple Cyclone** ☐ **Afterburner** ☐ **Electrostatic Precipitator** ☐

Scrubber ☐ _____ (type) **Other** ☒ Activated Carbon Filter (type)

8. Gas Cleaning Equipment Manufacturer	**Model No.**	**Collection Efficiency (Design Criteria)**
PYREG	PX1500 - Activated Carbon Filter	

9. Type of Equipment which Control Equipment is to Service:
2 x PYREG PX1500 pyrolysis reactors and 1 x flameless oxidation chamber

10. Stack Test to be Conducted:

Yes ☐ **No** ☐ TBD (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment TBD

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	TBD	GRAINS/ACFD**	TBD	GRAINS/ACFD**
Moisture Content	TBD	%	TBD	%
OR Wet Bulb Temperature	TBD	°F	TBD	°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

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Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	TBD	TBD
10 to 44 Microns		
Larger than 44 Microns		

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat_____

Combustion Chamber_____ _____ Operating Temperature at Afterburner _____ °F
(diameter) (length)

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

*See attached

Date Received: Local _____ _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date_____

By _____

Application Returned to Applicant:

Date_____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

PREMISES NUMBER: | | | | | | | |

Emission Calculations Revised By _____ Date _____

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪ 1-800-633-6101 ▪ www.mde.state.md.us

Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR PERMIT TO CONSTRUCT
GAS CLEANING OR EMISSION CONTROL EQUIPMENT

1. Owner of Installation Allegany Biochar, LLC	**Telephone No.** 540-230-2690		**Date of Application** 1213/23
2. Mailing Address 22 S Main St., Suite 400	**City** Greenville, SC	**Zip Code** 29601	**County** Greenville
3. Equipment Location 11600 Pittsburgh Plate Glass Road SE	**City/Town or P.O.** Cumberland, MD		**County** Allegany
4. Signature of Owner or Operator	**Title** Vice President		**Print or Type Name** Ted Niblock

5. Application Type: **Alteration** ☐ **New Construction** ☑

6. Date Construction is to Start: TBD **Completion Date (Estimate):** TBD

7. Type of Gas Cleaning or Emission Control Equipment:

Simple Cyclone ☐ **Multiple Cyclone** ☐ **Afterburner** ☐ **Electrostatic Precipitator** ☐

Scrubber [X] Wet Scrubber (type) **Other** ☐ _____ (type)

8. Gas Cleaning Equipment Manufacturer	**Model No.**	**Collection Efficiency (Design Criteria)**
PYREG	PX1500 - Scrubbing Tower	95 - 98%

9. Type of Equipment which Control Equipment is to Service:
2 x PYREG PX1500 pyrolysis reactors and 1 x flameless oxidation chamber

10. Stack Test to be Conducted:

Yes ☐ **No** ☐ TBD (Stack Test to be Conducted By) _____ (Date)

11. Cost of Equipment TBD

Estimated Erection Cost TBD

12. The Following Shall Be Design Criteria:

	INLET		OUTLET	
Gas Flow Rate	TBD	ACFM*	TBD	ACFM*
Gas Temperature	TBD	°F	TBD	°F
Gas Pressure	TBD	INCHES W.G.	TBD	INCHES W.G.
	PRESSURE DROP	TBD		
Dust Loading	TBD	GRAINS/ACFD**	TBD	GRAINS/ACFD**
Moisture Content	TBD	%	TBD	%
OR Wet Bulb Temperature	TBD	°F	TBD	°F
Liquid Flow Rate (Wet Scrubber)	TBD	GALLONS/MINUTE		

(WHEN SCRUBBER LIQUID OTHER THAN WATER INDICATE COMPOSITION OF SCRUBBING MEDIUM IN WEIGHT %)

*= ACTUAL CUBIC FEET PER MINUTE **= ACTUAL CUBIC FEET DRY

WHEN APPLICATION INVOLVES THE REDUCTION OF GASEOUS POLLUTANTS, PROVIDE THE CONCENTRATION OF EACH POLLUTANT IN THE GAS STREAM IN VOLUME PERCENT. INCLUDE THE COMPOSITION OF THE GASES ENTERING THE CLEANING DEVICE AND THE COMPOSITION OF EXHAUSTED GASES BEING DISCHARGED INTO THE ATMOSPHERE. USE AVAILABLE SPACE IN ITEM 15 ON PAGE 3.

13. Particle Size Analysis

Size of Dust Particles Entering Cleaning Unit	% of Total Dust	% to be Collected
0 to 10 Microns	100%	95%
10 to 44 Microns		
Larger than 44 Microns		

14. For Afterburner Construction Only:

Volume of Contaminated Air _____ CFM (DO NOT INCLUDE COMBUSTION AIR)

Gas Inlet Temperature _____ °F

Capacity of Afterburner _____ BTU/HR

Diameter (or area) of Afterburner Throat_____

Combustion Chamber_____ _____ Operating Temperature at Afterburner _____ °F
(diameter) (length)

Retention Time of Gases _____

15. Show Location of Dust Cleaning Equipment in the System. Draw or Sketch Flow Diagram Showing Emission Path from Source to Exhaust Point to Atmosphere.

*See attached

Date Received: Local _____ _____ State _____

Acknowledgement Date: _____

By _____

Reviewed By:

Local _____

State _____

Returned to Local:

Date_____

By _____

Application Returned to Applicant:

Date_____

By _____

REGISTRATION NUMBER OF ASSOCIATED EQUIPMENT: | | | | | | |

PREMISES NUMBER: | | | | | | | |

Emission Calculations Revised By _____ Date _____

Section III

Supporting Documentation

A. Emissions Calculations

Criteria Pollutant and GHG Emissions Calculations

Criteria and GHG Emissions

Process Description	Emission Source	Annual Process Throughput		Annual Process Duration		Pollutant	Emission Factors			GWP[2]	Potential Emission Estimates	
		rate	unit	rate	unit		rate	unit	source		lb/hr	tons/yr
Biosolids Processing Train - Pyrolysis 1	Natural Gas - 6 Cold Starts Per Year	250	MMBtu	8,760	hr	NO_x	9.80E-02	lb/MMBtu	1	-	0.00	0.01
						CO	8.24E-02	lb/MMBtu	1	-	0.00	0.01
						CO_2	1.18E+02	lb/MMBtu	1	1	3.36	14.71
						N_2O	2.16E-03	lb/MMBtu	1	298	0.00	0.00
						$PM_{2.5}$	7.45E-03	lb/MMBtu	1	-	0.00	0.00
						$CPM_{2.5}$	5.59E-03	lb/MMBtu	1	-	0.00	0.00
						$FPM_{2.5}$	1.86E-03	lb/MMBtu	1	-	0.00	0.00
						SO_2	5.88E-04	lb/MMBtu	1	-	0.00	0.00
						TOC	1.08E-02	lb/MMBtu	1	-	0.00	0.00
						CH_4	2.25E-03	lb/MMBtu	1	25	0.00	0.00
						VOC	5.39E-03	lb/MMBtu	1	-	0.00	0.00
						CO_2e	-	-	3	-	3.38	14.79
	Pyrolysis 1	7,594,920	lb (dry)	8,760	hr	$PM_{2.5}$	-	-	4	-	0.04	0.19
						NO_x	-	-	4	-	0.02	0.09
						SO_2	-	-	8	-	0.18	0.79
						CO	3.20E+00	lb/ton	5	-	1.39	6.08
						VOC	1.60E+00	lb/ton	5	-	0.69	3.04
	Belt Dryer 1	7,594,920	lb (dry)	8,760	hr	$PM_{2.5}$	-	-	7	-	0.02	0.09
						CH_4	-	-	7	25	0.25	1.10
						VOC	-	-	7	-	0.04	0.16
						SO_2	-	-	7	-	0.06	0.28
						NO_x	-	-	7	-	1.50	6.57
						CO	-	-	7	-	0.24	1.03
						CO_2e	-	-	3	-	6.29	27.53
Biosolids Processing Train - Pyrolysis 2	Natural Gas - 6 Cold Starts Per Year	250	MMBtu	8,760	hr	NO_x	9.80E-02	lb/MMBtu	1	-	0.00	0.01
						CO	8.24E-02	lb/MMBtu	1	-	0.00	0.01
						CO_2	1.18E+02	lb/MMBtu	1	1	3.36	14.71
						N_2O	2.16E-03	lb/MMBtu	1	298	0.00	0.00
						$PM_{2.5}$	7.45E-03	lb/MMBtu	1	-	0.00	0.00
						$CPM_{2.5}$	5.59E-03	lb/MMBtu	1	-	0.00	0.00
						$FPM_{2.5}$	1.86E-03	lb/MMBtu	1	-	0.00	0.00
						SO_2	5.88E-04	lb/MMBtu	1	-	0.00	0.00
						TOC	1.08E-02	lb/MMBtu	1	-	0.00	0.00
						CH_4	2.25E-03	lb/MMBtu	1	25	0.00	0.00
						VOC	5.39E-03	lb/MMBtu	1	-	0.00	0.00
						CO_2e	-	-	3	-	3.38	14.79
	Pyrolysis 2	7,594,920	lb (dry)	8,760	hr	$PM_{2.5}$	-	-	4	-	0.04	0.19
						NO_x	-	-	4	-	0.02	0.09
						SO_2	-	-	8	-	0.18	0.79
						CO	3.20E+00	lb/ton	5	-	1.39	6.08
						VOC	1.60E+00	lb/ton	5	-	0.69	3.04
	Belt Dryer 2	7,594,920	lb (dry)	8,760	hr	$PM_{2.5}$	-	-	7	-	0.02	0.09
						CH_4	-	-	7	25	0.25	1.10
						VOC	-	-	7	-	0.04	0.16
						SO_2	-	-	7	-	0.06	0.28
						NO_x	-	-	7	-	1.50	6.57
						CO	-	-	7	-	0.24	1.03
						CO_2e	-	-	3	-	6.29	27.53
Wood Waste Processing Train - Pyrolysis 3	Natural Gas - 6 Cold Starts Per Year	250	MMBtu	8,760	hr	NO_x	9.80E-02	lb/MMBtu	1	-	0.00	0.01
						CO	8.24E-02	lb/MMBtu	1	-	0.00	0.01
						CO_2	1.18E+02	lb/MMBtu	1	1	3.36	14.71
						N_2O	2.16E-03	lb/MMBtu	1	298	0.00	0.00
						$PM_{2.5}$	7.45E-03	lb/MMBtu	1	-	0.00	0.00
						$CPM_{2.5}$	5.59E-03	lb/MMBtu	1	-	0.00	0.00
						$FPM_{2.5}$	1.86E-03	lb/MMBtu	1	-	0.00	0.00
						SO_2	5.88E-04	lb/MMBtu	1	-	0.00	0.00
						TOC	1.08E-02	lb/MMBtu	1	-	0.00	0.00
						CH_4	2.25E-03	lb/MMBtu	1	25	0.00	0.00
						VOC	5.39E-03	lb/MMBtu	1	-	0.00	0.00
						CO_2e	-	-	3	-	3.38	14.79
	Pyrolysis 3	5,993,592	lb (dry)	8,760	hr	$PM_{2.5}$	-	-	4	-	0.04	0.19
						NO_x	-	-	9	-	0.41	1.80
						SO_2	-	-	9	-	0.12	0.53
						CO	-	-	9	-	0.01	0.04
						$PM_{2.5}$	-	-	7	-	0.02	0.09

Cold Starts:

Fuel Type:	Natural Gas	
Per Year:	1000	Dth
Per Cold Start:	166.6666667	Dth

Small Boiler, Uncontrolled EFs:

Pollutant	EF (lb/10^6 scf)
NO_x	100
CO	84
CO_2	120000
N_2O	2.2
$PM_{2.5}$	7.6
$CPM_{2.5}$	5.7
$FPM_{2.5}$	1.9
SO_2	0.6
TOC	11
CH_4	2.3
VOC	5.5

* To convert lb/10^6 scf to lb/MMBtu, divide by 1,020.

1 lb = 453592 mg

Belt Dryer Exhaust Air to Scrubber Rates (from Source 7):

Biosolids 2281 m^3/hr = 1350 CFM

*Same exhaust flow rate assumed for wood waste dryer due to lack of data

Air Contaminant Loads and Additional Air Exhaust Information (from Source 7):

Biosolids

Pollutant	Rate or Concentration	Unit		
$PM_{2.5}$	0.41	lb/hr	------>	Concentration at inlet; assume 95% removal rate
CH_4	50	mg/m^3	------>	Exhaust concentration at European Stela plant
VOC	7.18	mg/m^3	------>	Plant1 exhaust concentration
SO_2	0.027	lb/hr	------>	Plant2 exhaust emission rate
	0.1	lb/hr	------>	Plant3 exhaust emission rate
NO_x	1.47	lb/hr	------>	Plant2 exhaust emission rate
	1.53	lb/hr	------>	Plant3 exhaust emission rate
CO	0.02	lb/hr	------>	Plant2 exhaust emission rate
	0.45	lb/hr	------>	Plant3 exhaust emission rate

*Same rates/concentrations assumed for wood waste dryer due to lack of data

	Belt Dryer 3	5,993,592	lb (dry)	8,760	hr	CH_4	-	-	7	25	0.25	1.10
						VOC	-	-	7	-	0.04	0.16
						SO_2	-	-	7	-	0.06	0.28
						NO_x	-	-	10	-	0.02	0.09
						CO	-	-	7	-	0.24	1.03
						CO_2e	-	-	3	-	6.29	27.53
Wood Waste Processing Train - Pyrolysis 4	Natural Gas - 6 Cold Starts Per Year	250	MMBtu	8,760	hr	NO_x	9.80E-02	lb/MMBtu	1	-	0.00	0.01
						CO	8.24E-02	lb/MMBtu	1	-	0.00	0.01
						CO_2	1.18E+02	lb/MMBtu	1	1	3.36	14.71
						N_2O	2.16E-03	lb/MMBtu	1	298	0.00	0.00
						$PM_{2.5}$	7.45E-03	lb/MMBtu	1	-	0.00	0.00
						$CPM_{2.5}$	5.59E-03	lb/MMBtu	1	-	0.00	0.00
						$FPM_{2.5}$	1.86E-03	lb/MMBtu	1	-	0.00	0.00
						SO_2	5.88E-04	lb/MMBtu	1	-	0.00	0.00
						TOC	1.08E-02	lb/MMBtu	1	-	0.00	0.00
						CH_4	2.25E-03	lb/MMBtu	1	25	0.00	0.00
						VOC	5.39E-03	lb/MMBtu	1	-	0.00	0.00
						CO_2e	-	-	3	-	3.38	14.79
	Pyrolysis 4	5,993,592	lb (dry)	8,760	hr	$PM_{2.5}$	-	-	4	-	0.04	0.19
						NO_x	-	-	9	-	0.41	1.80
						SO_2	-	-	9	-	0.12	0.53
						CO	-	-	9	-	0.01	0.04
	Belt Dryer 4	5,993,592	lb (dry)	8,760	hr	$PM_{2.5}$	-	-	7	-	0.02	0.09
						CH_4	-	-	7	25	0.25	1.10
						VOC	-	-	7	-	0.04	0.16
						SO_2	-	-	7	-	0.06	0.28
						NO_x	-	-	10	-	0.02	0.09
						CO	-	-	7	-	0.24	1.03
						CO_2e			3		6.29	27.53

Notes:

1. AP-42 Chapter 1.4, Table 1.4-1 for Small Boilers and Table 1.4-2

2. GWP - Global Warming Potentials obtained from 40 CFR 98.

*3. CO2e Emissions = (CO2 Emissions * CO2 GWP) + (CH4 Emissions * CH4 GWP) + (N2O Emissions * N2O GWP)*

4. Vendor provided potential emission estimates - using exhaust values from 'Pyreg - Estimated Emissions' tab at a flow rate of 1940 m^3/hr. Exhaust values from Pyreg tab include emissions for both pyrolysis units for a given process train.

5. AP-42 Chapter 2.2, Table 2.2-1 for Multiple Hearth Sewage Sludge Incinerator with Wet Scrubber / Impingement Scrubber

6. AP-42 Chapter 1.6, Table 1.6-2 for Wood Residue Combustion (dry wood)

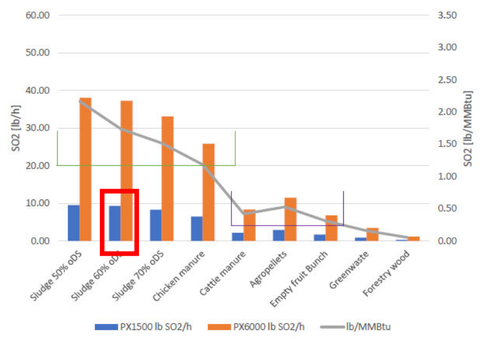
7. Berlie Technologies, Inc. - Proposal Budget 13320 - Low Temperature Belt Dryer and Auxilary Equipments

8. Pyreg-supplied data: 9 lb/hr SO2 estimated from the figure below. Per Pyreg, the wet scrubber removes SO2 at an efficiency of 98%.

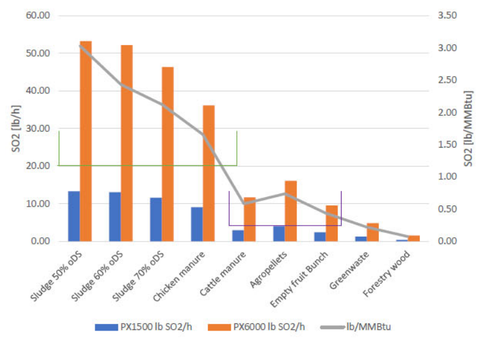
PX1500 SO_2 emissions projection for PX1500 and PX6000 (from various biomass sources)

Biomasses vary around 0,04 to 1% S in the DS. The tables below are based on the assumption of sulphur going into to the gaseous phase by 50% (I) and 70% (II)

I



II



Notes:

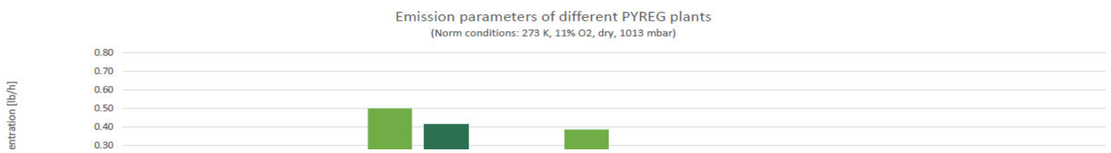
- Each biomass will have a unique exhaust profile and flowrate (m³/h).
- Additional measures against SOx emission are available, if a reduction is required by the air permit:
  - Tier 1 could require a wet scrubbing system, available by PYREG
  - Tier 2 could require a precipitation in the stack by third party or, alternatively adding lime with a dosing station, available by PYREG.

(Norm conditions: 273 K, 11% O2, dry, 1013 mbar)

PYREG

9. Pyreg-supplied data:

PYREG PX1500 Emissions Reporting [lb/h]



Notes:
- The **Green Waste** values are based on municipal yard waste from land scaping companies with an input fuel capacity of **5.36 MMBtu**
- The **Bark** values are based the bark of forest wood residues with an input fuel capacity of **5.46 MMBtu**

PYREG

10. Per Pyreg, NOx concentration of wood dryer exhaust is <5 mg/m^3. 5 mg/m^3 is used in these calculations as an estimate.

Criteria Pollutant and GHG Total Emissions

Pollutants	Potential to Emit	
	lb/hr	tpy
VOC	1.53	6.62
NO_x	3.91	16.91
CO	3.74	16.17
$PM_{2.5}$	0.25	1.10
SO_2	0.85	3.69
CO_2e	38.65	166.98

HAP/TAP Emissions Calculations

Ambient Impact Compliance Demonstration

HAP / TAP	CAS No.	HAP? (Y/N)	Screening Level Concentrations (ug/m^3)			HAP / TAP Emission Rate	Emission Factor Source (See Notes)	1-hr STEL Calculated Allowable Emission Rate[3]	8-hr TWA Calculated Allowable Emission Rate[3]	Annual Calculated Allowable Emission Rate[2]	1-hr STEL PASS? (AER > TAP Emission Rate)	8-hr TWA PASS? (AER > TAP Emission Rate)	Annual PASS? (AER > TAP Emission Rate)
			1-hr STEL	8-hr TWA	Annual	(lb/hr)	EF Source	(lb/hr)2	(lb/hr)3	(lb/yr)	(PASS / FAIL)	(PASS / FAIL)2	(PASS / FAIL)3
1,3-Butadiene	106990	Y	-	44.24539877	0.03	0	6	-	7.21E-01	4.99E+01	-	PASS	PASS
Acrolein	107028	Y	2.292842536	1.8	-	0	6	3.74E-02	2.93E-02	-	PASS	PASS	-
Acrylonitrile	107131	Y	-	43.39468303	0.01	0	6	-	7.07E-01	1.66E+01	-	PASS	PASS
Antimony	7440360	Y	-	5	-	4.41E-06	8	-	8.15E-02	-	-	PASS	-
Arsenic	7440382	Y	-	0.1	0.0002	4.41E-06	8	-	1.63E-03	3.33E-01	-	PASS	PASS
Arsenic & Compounds - TAP	7440382	Y	-	0.1000	2.33E-03	4.41E-06	8	-	1.63E-03	3.88E+00	-	PASS	PASS
Benzene	71432	Y	79.86707566	15.97341513	0.13	0	6	1.30E+00	2.60E-01	2.16E+02	PASS	PASS	PASS
Benzo[a]pyrene*	50328	Y	-	-	-	BDL	8	-	-	-	PASS	PASS	PASS
Benzyl chloride	100447	Y	-	51.77096115	-	0	6	-	8.44E-01	-	-	PASS	-
Cadmium	7440439	Y	-	0.02	0.0006	4.41E-06	8	-	3.26E-04	9.98E-01	-	PASS	PASS
Cadmium, Elemental and Compounds - TAP	7440439	Y	-	0.1000	5.56E-03	4.41E-06	8	-	1.63E-03	9.25E+00	-	PASS	PASS
Chromium	7440473	Y	-	5	-	4.41E-06	8	-	8.15E-02	-	-	PASS	-
Chromium (vi), water-soluble - TAP	7440473	Y	-	0.5000	8.33E-04	4.41E-06	8	-	8.15E-03	1.39E+00	-	PASS	PASS
Cobalt	7440484	Y	-	0.2	-	4.41E-06	8	-	3.26E-03	-	-	PASS	-
Copper	7440508	N	-	2	-	8.82E-06	8	-	3.26E-02	-	-	PASS	-
Dioxins & Furans - TAP	1746016	Y	0.000	0.0000	3.00E-07	BDL	8	0.00E+00	0.00E+00	4.99E-04	PASS	PASS	PASS
Diphenylmethane diiocyanate	101688	Y	-	0.511779141	-	0	6	-	8.34E-03	-	-	PASS	-
Epichlorohydrine	106898	Y	-	18.92229039	0.8	0	6	-	3.08E-01	1.33E+03	-	PASS	PASS
Ethylene dichloride	107062	Y	-	404.7443763	0.04	0	6	-	6.60E+00	6.66E+01	-	PASS	PASS
Ethylene oxide	75218	Y	-	18.01635992	-	0	6	-	2.94E-01	-	-	PASS	-
Hydrogen Chloride - TAP	7647010	Y	29.83231084	165.271002	0.7	1.71E-02	7	4.86E-01	2.69E+00	1.16E+03	PASS	PASS	PASS
Hydrogen cyanide	74908	Y	51.9595092	17.68834356	-	0	6	8.47E-01	2.88E-01	-	PASS	PASS	-
Hydrogen sulfide	7783064	Y	69.69325153	13.93865031	-	2.14E-03	Pyreg - Est.	2.50E-01	4.99E-02	-	PASS	PASS	-
Lead, Inorganic Compounds - TAP	7439921	Y	-	0.5000	-	5.73E-05	8	-	8.15E-03	-	-	PASS	-
Manganese	7439965	Y	-	2	-	2.20E-05	8	-	3.26E-02	-	-	PASS	-
Mercury	7439976	Y	0.3	0.1	-	1.71E-04	7	4.89E-03	1.63E-03	-	PASS	PASS	-
Mercury (Metallic & Inorganic Compounds) - TAP	7439976	Y	-	0.2500	-	1.71E-04	7	-	4.08E-03	-	-	PASS	-
Nickel	7440020	Y	-	1	-	4.41E-06	8	-	1.63E-02	-	-	PASS	-
Nickel (Soluble Compounds) - TAP	7440020	Y	-	1.0000	4.17E-02	4.41E-06	8	-	1.63E-02	6.94E+01	-	PASS	PASS
PCDD/F	-	Y	-	-	0.00000003	BDL	8	-	-	4.99E-05	PASS	PASS	PASS
Pentachlorphenol	87865	Y	-	5	-	0	6	-	8.15E-02	-	-	PASS	-
Phosgene	75445	Y	-	4.045807771	-	0	6	-	6.59E-02	-	-	PASS	-
Propylene oxide	75569	Y	-	47.50920245	0.1	0	6	-	7.74E-01	1.66E+02	-	PASS	PASS
TDI	584849	Y	1.424539877	0.356134969	-	0	6	2.32E-02	5.81E-03	-	PASS	PASS	-
Tin	7440315	N	-	20	-	4.41E-06	8	-	3.26E-01	-	-	PASS	-
Trichloroethene	79016	Y	1343.558282	537.4233129	-	0	6	2.19E+01	8.76E+00	-	PASS	PASS	-
Vanadium & Compounds - TAP	7440622	N	-	0.5000	-	4.41E-06	8	-	8.15E-03	-	-	PASS	-
Vinylchloride	75014	Y	-	25.56237219	0.23	0	6	-	4.17E-01	3.83E+02	-	PASS	PASS
Σ16 EPA Priority PAH	-	Y	-	-	-	BDL	8	-	-	-	PASS	PASS	PASS

Notes

1) The biosolids processing train is assumed to be the primary source of HAP/TAP emissions.
2) Annual AER = 1664 x SL ------> Assumes stack height = 10m / no downwash
3) 1-hour or 8-hour AER = 0.0163 x SL ------> Assumes stack height = 10m / no downwash
4) 1 lb = 453592 mg
5) Dekra-estimated PX1500 pyrolysis mean exhaust gas flow rate at operating conditions = 1940 m^3/hr

4 Measurement results

4.1 Auxiliary parameter

4.1.1 Clean gas Pyrolysis

Table 4.1.1-1 Exhaust gas condition during measurements

Parameter	Mean value	min. value [7]	max. value [7]
Air pressure	1003 mbar	1002 mbar	1005 mbar
Exhaust gas temperature	163 °C	97 °C	171 °C
Exhaust gas velocity [8]	11.0 m/s	4.1 m/s	15.6 m/s
Exhaust gas moisture	21,2 Vol-%	13,0 Vol-%	27,5 Vol-%
Oxygen content dry	5,4 Vol-%	1,4 Vol-%	9,7 Vol-%
Volume flow at operating conditions [9]	1940 m /h³	730 m /h³	2470 m /h³
Flow rate at standard conditions dry (0 °C; 1013 hPa) [9]	940 m³ n/h	430 m³ n/h	1720 m³ n/h

6) HAPs / TAPs with integer "0" emission rates are assumed to be destroyed by oxidation, per Pyreg specifications

PYREG organic hazardous substances emissions assessment

The sophisticated combustion system ensures a full oxidation (@ >850 °C) of organic hazardous compounds, including pharmaceuticals, microplastics and pathogens. The list below indicates the vaporization temperature of several relevant organic hazardous substances. They are all vaporized and safely extracted with carbonization temperatures of 550 °C and above

Source 7 Calculation Derivation:
= HCl or Hg (mg/Nm^3) * 1940 m^3/hr (PX1500 exhaust flow rate) *
(1 lb / 453592 mg) * 2 biosolids pyrolysis units

Source 8 Calculation Derivation:
= Avg. mass flow rate (g/h) * 0.00220462 (lb/g) *
* 2 biosolids pyrolysis units

vaporized and safely extracted with carbonization temperatures of 550 °C and above.

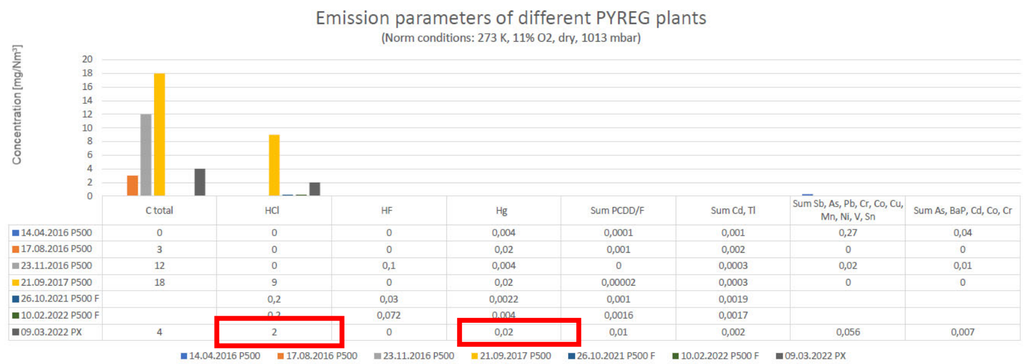
#	Parameter	Formula	vaporization point [°C]	Chemistry	Assessment
1.	Acrolein	C3H4O	53	Organic	Destroyed by Oxidation
2.	Acrylonitrile	C3H3N	77	Organic	Destroyed by Oxidation
3.	Benzyl chloride	C7H7Cl	179	Organic	Destroyed by Oxidation
5.	Benzene	C6H6	80,1	Organic	Destroyed by Oxidation
7.	1,3-Butadiene	C4H6	- 4,4	Organic	Destroyed by Oxidation
10.	Ethylen dichlorid	C2H4Cl2	83,47	Organic	Destroyed by Oxidation
11.	PCDD/F	several	several	Organic	Combustion is not allowing "De-Novo Synthesis"
12.	Epichlorohydrin	C3H5ClO	117,9	Organic	Destroyed by Oxidation
13.	Ethylene oxid	C2H4O	10,7	Organic	Destroyed by Oxidation
14.	Formaldehyde	CH2O	-19	Organic	Destroyed by Oxidation
15.	Hydrogen cyanide	HCN	25,6	Organic	Destroyed by Oxidation
16.	Diphenylmethane diisocyanate	C15H10N2O2	314	Organic	Destroyed by Oxidation
18.	PAH*	several	several	Organic	Destroyed by Oxidation
19.	Pentachlorphenol	C6HCl5O	310	Organic	Destroyed by Oxidation
20.	Phosgene	COCl2	8,3	Organic	Destroyed by Oxidation
21.	Propylene oxide	C3H6O	34	Organic	Destroyed by Oxidation
22.	TDI	C9H6N2O2	251	Organic	Destroyed by Oxidation
23.	Trichloroethylene	C2HCl3	87,2	Organic	Destroyed by Oxidation
24.	Vinylchloride	C2H3Cl	-13,4	Organic	Destroyed by Oxidation

Notes:
* highest vaporization point is 547 °C (Anthanthen)

PYREG

7) Pyreg-supplied data:

PYREG Emissions Reporting (from sewage sludge) II



14.04.2016 P500	0	0	0	0,004	0,0001	0,001	0,27	0,04
17.08.2016 P500	3	0	0	0,02	0,001	0,002	0	0
23.11.2016 P500	12	0	0,1	0,004	0	0,0003	0,02	0,01
21.09.2017 P500	18	9	0	0,02	0,00002	0,0003	0	0
26.10.2021 P500 F		0,2	0,03	0,0022	0,001	0,0019		
10.02.2022 P500 F		0,2	0,072	0,004	0,0016	0,0017		
09.03.2022 PX	4	2	0	0,02	0,01	0,002	0,056	0,007

Notes:
- Emissions of organic pollutants are regularly below the detection limit.

PYREG

8) Dekra-provided average mass flow rates for Pyreg PX0750 emissions at Losbach Wastewater Treatment Plant:

6.2 Measurement results

Measuring component	Medium concentration [mg/m3]	Highest concentration [mg/m3]	Limit value [mg/m3]	Average mass flow [kg/h]	Highest mass flow [kg/h]	Limit value [kg/h]
Total dust	60,5	62,1	10	0,038	0,039	-
CO	11,1	11,3	50	0,007	0,007	-
NOx as NO2	141,1	149,2	200	0,088	0,093	-
Total carbon	0,0	0,0	10	0,000	0,000	-
SOx as SO2	6,9	7,8	50	0,004	0,005	-
HF	0,0	0,0	1	0,000	0,000	-
HCL	1,2	1,7	10	0,001	0,001	-
Mercury	0,011	0,014	0,03	0,007	0,009	-

	[mg/m3]	[mg/m3]	[mg/m3]	[g/h]	[g/h]	[g/h]
Cadmium [Cd]	<0,001	<0,001	-	<0,001	<0,001	-
Thallium [Tl]	<0,001	<0,001	-	<0,001	<0,001	-
Antimony [Sb]	<0,001	<0,001	-	<0,001	<0,001	-
Arsenic [As]	<0,001	<0,001	-	<0,001	<0,001	-
Lead [Pb]	<0,021	<0,022	-	<0,013	<0,014	-
Chromium [Cr]	<0,001	0,002	-	<0,001	0,001	-
Cobalt [Co]	<0,001	<0,001	-	<0,001	<0,001	
Copper [Cu]	<0,002	<0,002	-	<0,002	<0,002	-
Manganese [Mn]	<0,008	0,015	-	<0,005	0,009	
Nickel [Ni]	<0,001	0,002	-	<0,001	0,002	-
Vanadium [V]	<0,002	<0,002	-	<0,001	<0,001	-
Tin [Sn]	<0,001	<0,001	0,5	<0,001	<0,001	-
Benzo(a)pyrene	0,000	0,000	-	0,000	0,000	-
	[ng/m3]	[ng/m3]	[ng/m3]	[mg/h]	[mg/h]	[mg/h]
PCDD/F	0,00	0,00	0,1	0,000	0,000	-

9) " * " indicates that the HAP/TAP is included in the EPA's 16 Priority PAHs.
10) BDL = Below Detectable Limit

HAP/TAP Total Emissions

Pollutants	Potential to Emit	
	lb/hr	tpy
HAPs	1.15	4.99

B. General Location Map

Proposed Biochar Facility

11600 Pittsburgh Plate Glass Road SE, Cumberland, MD 21502

Figure 2

Site Layout Plan

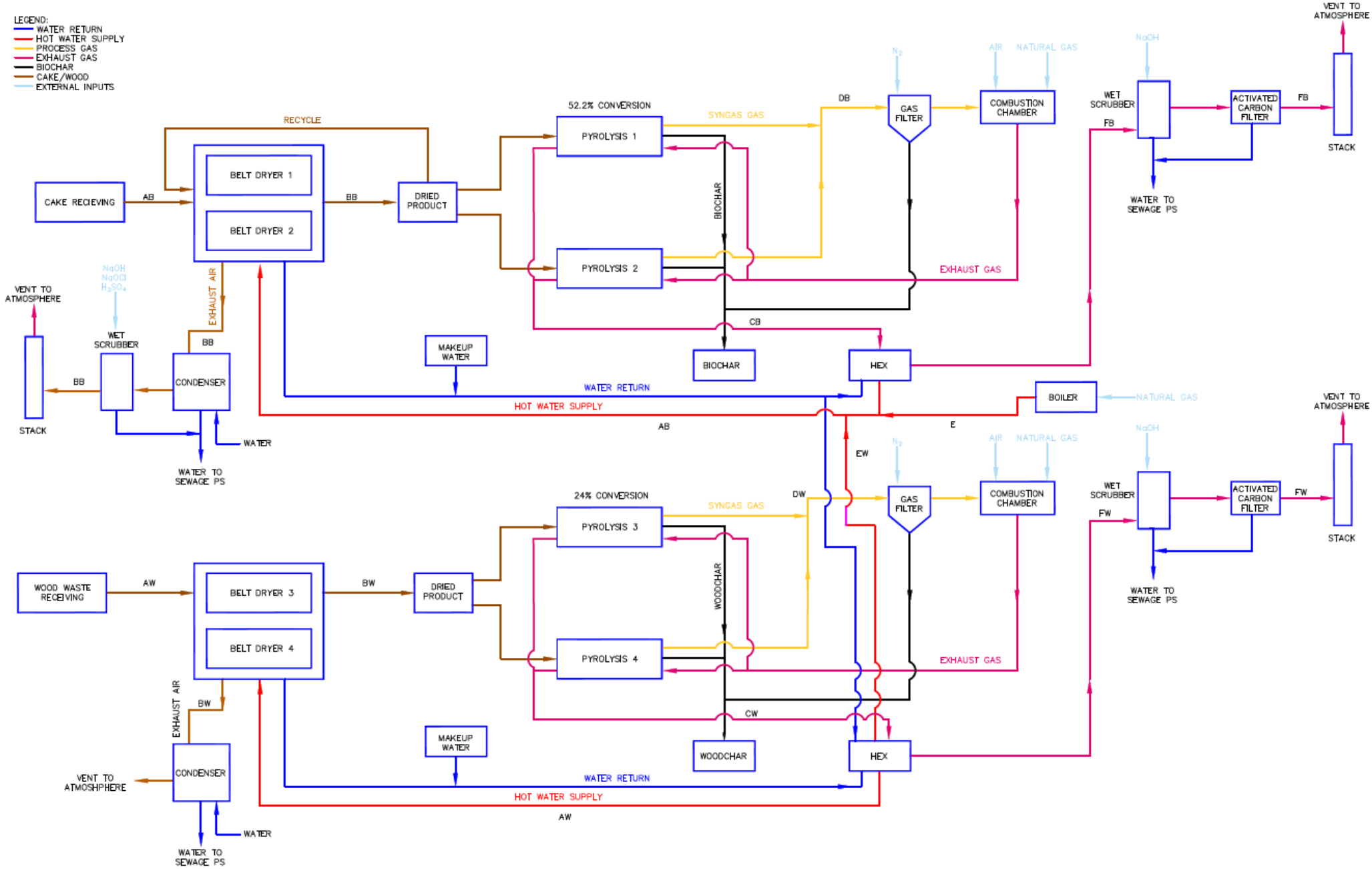
Proposed Biochar Facility

11600 Pittsburgh Plate Glass Road SE, Cumberland, MD 21502

Figure 1

Site Location Map

C. Process Flow Diagrams


LEGEND:
WATER RETURN
HOT WATER SUPPLY
PROCESS GAS
EXHAUST GAS
BIOCHAR
CAKE/WOOD
EXTERNAL INPUTS
CAKE RECIEVING
AB
BELT DRYER 1
BELT DRYER 2
RECYCLE
BB
DRIED PRODUCT
52.2% CONVERSION
PYROLYSIS 1
PYROLYSIS 2
SYNGAS GAS
BIOCHAR
DB
GAS FILTER
COMBUSTION CHAMBER
AIR
NATURAL GAS
N2
WET SCRUBBER
NaOH
ACTIVATED CARBON FILTER
FB
VENT TO ATMOSPHERE
STACK
WATER TO SEWAGE PS
EXHAUST AIR
CONDENSER
WATER
MAKEUP WATER
CB
HEX
BOILER
E
AB
WOOD WASTE RECEIVING
AW
BELT DRYER 3
BELT DRYER 4
BW
24% CONVERSION
PYROLYSIS 3
PYROLYSIS 4
WOODCHAR
DW
EW
FW
CW

D. Vendor Specifications

Berlie Technologies Inc.
1245 Rue Industrielle
La Prairie, QC J5R 2E4 Canada
A Berlie-Falco company

T: 450-444-0566
F: 450-444-2227
*www.*Berliefalco.com

PROPOSAL BUDGET 13320

LOW TEMPERATURE BELT DRYER AND AUXILARY EQUIPMENTS

Presented to:

Brecc Avellar
Process Engineer
Tel: +1 (540) 230 2690
Email: brecc.avellar@nexuspmg.com

Date **November 10th 2023**

Prepared by: Lorenzo Borella
Division Director
Berlie Technologies Inc.
Ph.: 450-444-0566 M: 514-826-1307

Lborella@Berlie-falco.com
www.Berliefalco.com

1. TABLE OF CONTENTS

2. BERLIE TECHNOLOGIES INC.

The Berlie-Falco Group is a Canadian company whose operating companies were established more than 30 years ago. Its operating companies, Berlie Technologies (Berlie) and Falco Technologies (Falco) combine their specific expertise to develop inventive solutions to respond to the needs of each customer. Their shared Mission: Provide turnkey type inventive industrial solutions to optimize production processes.

Berlie Technologies and Falco Technologies alike possess reputations of expertise that go beyond the borders of Quebec and Canada.

Berlie Technologies Inc. (Berlie) is renowned for its expertise in the treatment of wastewater and sludge (biosolids / organic wastes). Berlie puts its competency in process engineering to the service of its industrial clientele, engineering firms, wastewater treatment plants operators and municipalities. We often act as prime contractor of turnkey projects, from conception to fabrication, and from installation to commissioning.

Berlie shines on the international stage, as much in traditional markets as in emerging economies.

Berlie brings together an experienced team of engineers and technicians offering services in process engineering and mechanical engineering, with specialties in dewatering, drying, agitation, material transport and thermal exchange for fluids and solids.

3. REFERENCES

Berlie manufactures and commissions industrial drying systems since the mid-1980s. Our Closed Loop Drum Drying systems are in operation many countries and are offered with evaporation capacities that range from 500 to 6000 kg of evaporation per hour per train.

Our partnership with Stela Laxhuber GmbH of Massing, Germany, was created in 2010, based on which Berlie can now offer low temperature belt drying systems worldwide.

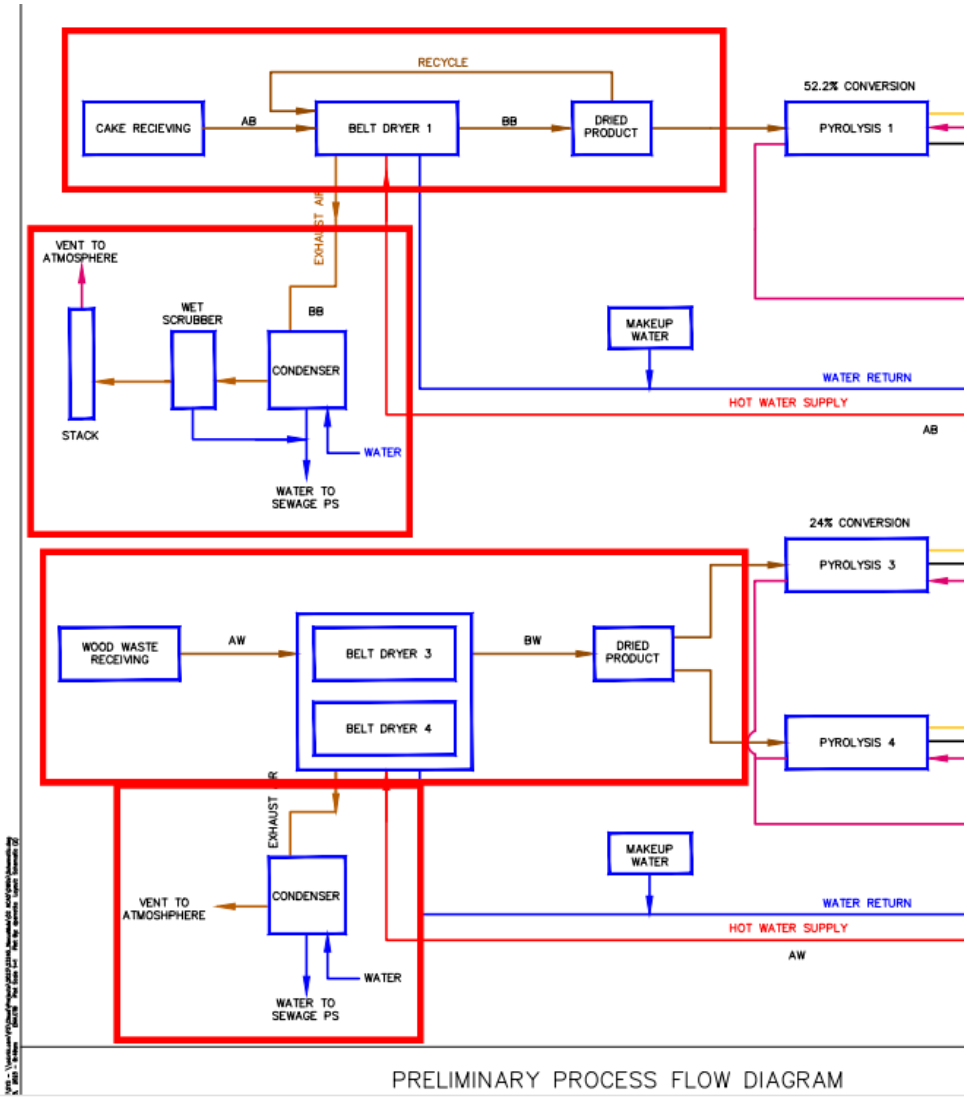
Stela Laxhuber has been in business for more than 90 years and has acquired its drying expertise over more than 50 years of manufacturing and commissioning over 2000 industrial drying plants with more than 150 belt drying installations for drying sludge and waste materials. Realized projects range from 100 to 25,000 kg of water evaporation per hour.

All equipment parts are fabricated either by Stela Laxhuber, in Germany, or at the Berlie-Falco production center, to allow Stela Laxhuber to guaranty a prompt and reliable service.

Berlie will complete Stela Laxhuber's offering with its intstallation and commissioning services and will ensure a local response where drying systems are sold and installed to respond to requests for technical support and other services

4. PROJECT DESCRIPTION

Project name: Nexus W2V Biomass&Biosolids Dryer
Quotation Reference Number: 13320
Installation Location: Allegany County Maryland USA
Resume of Project: This project aims to produce bio char from Biomass (woodchips) and from Biosolids (municipal waste). This facility will take their infeed product from different sources and therefore will receive a variety of quality and compositions. There are two different Pyrolysis lines fully dedicated to each of the waste streams. The Pyrolysis units are from the Pyreg Company. The wasted heat of these units will be used to as heating source for the dryers. On this proposal, Berlie Technologies will focus on the units in the red perimeter below.



Scope of work: Berlie Technology's scope is to provide high level budgetary quotation and information on the following equipments:

Biosolids drying Line:

1. Biosolids feed hopper/cake pumps
2. Biosolids dryer + back-mixing system
3. Odor control system
4. Dried product conveyance system

Biomass/wood drying Line:

1. Wood feed hopper/conveyance system
2. Wood dryer
3. Dried product conveyance system

Plant Process Data:

1- Biosolids:

a. **Product:** Municipal dewatering sludge, approx. 25% TS, 70-75% VS, undigested, dewatered via centrifuge or belt filter press
b. **Estimated average bulk density:** 802 kg/m^3.
c. Moisture content infeed material (% wet): 75%
d. Material Infeed Rate: 1.7 mtph of 75% humid sludge
e. Moisture content outfeed material (%wet): 10%
f. Material Outfeed Rate: 0.47 mtph

2- Biomass:

a. **Product:** Whole tree chips (passed through 4" screen)
b. **Estimated average bulk density:** 722 kg/m^3.
c. Moisture content infeed material (% wet): 40%
d. Material Infeed Rate: 2.5 mtph of 40% humid wood waste
e. Moisture content outfeed material (%wet): 10%
f. Material Outfeed Rate: 1.67 mtph

5. BIOSOLIDS FEED HOPPERS & CAKE PUMPS

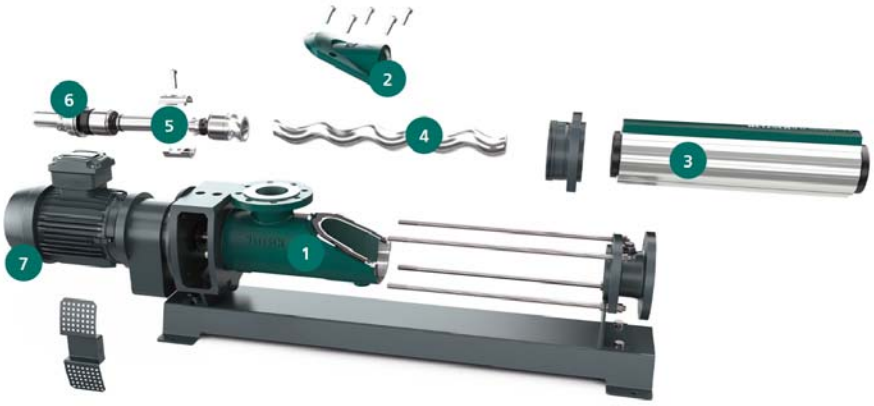
Cake Receiving Unit

Material in Wet material Storage: Municipal Sludge 75% wet
Installation Location: Outdoor
Type: Bin with live bottom and hydraulic opening
Live bottom motors: 2x 1.5hp
Wet material Storage Material: Carbon Steel
Capacity: Cover 8h of production
Hopper Volume: 19.8 m^3 (700 ft^3)
Overall Dimensions: 12’ Length x 10’ Wide x 6’ height

Capital Cost of Equipments: 251 000 USD

Cake Sludge Pumps:

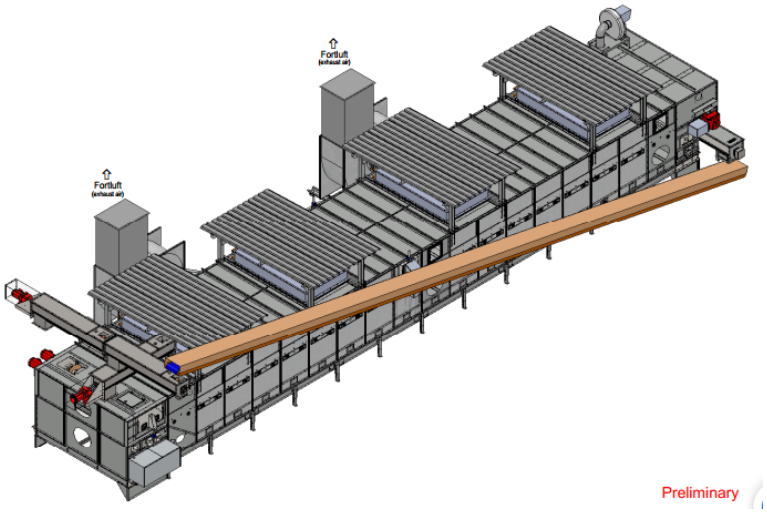
Pump Type: Progressive Cavity Pumps
Installation Location: Indoor
Housing material: Carbon Steel
Internal Material: 420 Stainless Steel
Polymer Injection Ring: Included
Suggested Quantities: 2
Motor Sizing: 20 HP



Unit Capital Cost of Equipments: 44 000 USD

6. BIOSOLIDS DRYER + BACK MIXING UNIT

Dryer Model: BTL1-3000-18 2/2
Installation Location: Indoor
Dryer Footprint Total: 7.5m witdh x 18m length x 4.2 m height (see attached layout drawing)
Drying Surface: 54 m^2
Thermal Requirements with hot water (140°C IN and 100°C OUT) : 1200 KW
Electrical Load Connected: 150 KW
Electrical Load Consumption: 110 KW
Exhaust Air to Scrubber: 2 281 m^3/h (1350 CFM)
Dryer Evaporation Rate: 1300 Kg/h



Capital Cost of Equipments: 1 200 000 USD

7. BIOSOLIDS ODOR CONTROL SYSTEM

Scrubber Type: Two Stage Wet Scrubber
Sludge Chemical Composition: Municipal dewatering sludge, approx. 25% TS, 70-75% VS, undigested, dewatered via centrifuge or belt filter press. Exact composition, Unknown
Installation Location: Indoor
Air Contaminants & Concentration: Unknown
Local Air Emissions Standards and Limits: Unknown - target ammonia < 1 ppmv, H2S < 0.5 ppmv, 100 ton/yr VOC
Air Flow to be treated at Scruber Inlet: 2 281 m^3/h (1350 CFM)
Air Flow Temperature to be treated: 40°C
Inlet Gas Moisture Content: 100%

Design Parameters and Hypothesis taken to Size Scrubber:

Process Air Contaminants Loads /concentration at inlet:
These values have been taken from similar municipal sludge project values; these are not exact values for the actual project. Sludge samples and testing will need to be done to determine the exact exhaust air composition

1- MeSH: 0.09 lb/hr
2- H2S 0.13 lb/hr
3- NH3: 1.65 lb/hr
4- PM: 0.41 lb/hr

Removal Rate:

1- MeSH: 97.38% Removal rate
2- H2S 99.72% Removal rate
3- NH3: 99.29% Removal rate
4- PM: 95% ** not able to exactly quantify however with the two quenches, most of all particles should be removed from air stream**

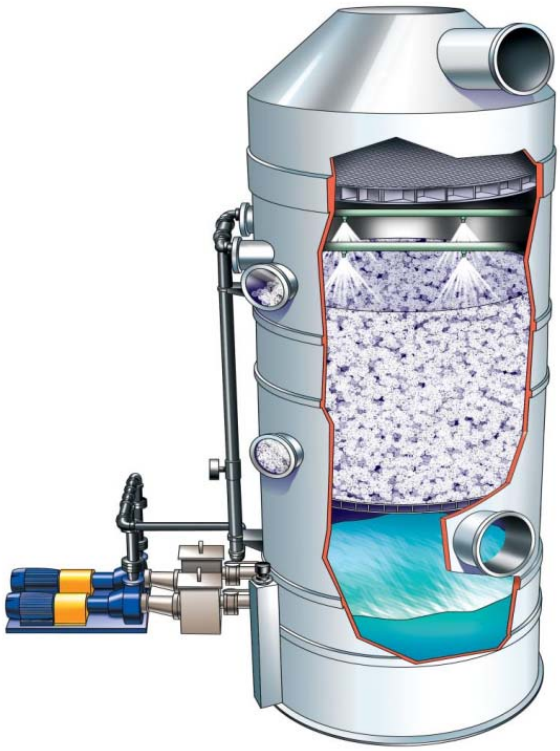
Stage 1:
Scrubber Material of construction: Polyprpylene
Scrubber Diameter & Height: 24'' x 20 feet (see drawings attached)
Recirculating Pumps: 30 GPM
Chemical Addition: H2SO4

Stage 2:
Scrubber Material of construction: Polyprpylene
Scrubber Diameter & Height: 24'' x 20 feet (see drawings attached)
Recirculating Pumps: 30 GPM
Chemical Addition: NaOCl & NaOH

Chemical Feed Pumps assembly:
1 Polypropylene Cabinet
Pump quantity: 3
Electric metering pumps

Chemical Consumption:

1- 50% NaOH :	0.1 gph
2-36% H2SO4	1.2 gph
3-15% NaOCl	0.9 gph
4- Acidic Waste	1.4 gph
5-Alkaline Waste	1.4 gph
6- Electrical Power	5.4 kW
7- Plant Water	2.5 gph



Capital Cost of Equipments: 250 000 USD

Additional Air Exhaust Information:

1- Values of the exhaust Air measured in one of Stela's europeen plants are. The measured values in Germany are not the same as in North America and therefore an exact correlation has not yet been possible.

   a. Odor Level (GEE/m^3): 35.220
   b. GES-C (mg/m^3): 130
   c. Methan (mg/m^3):50
   d. NMVOC (mg/m^3): 80

2- Additional information on Rotary Sludge Dryers Air emission's testing

Plant1:

Evaporation Rates: 6000 Kg/h
VOC: 7.18 mg/Nm^3
Methane: 2ppm

Plant2:

Evaporation Rates: 3000 Kg/h
SO2: 0.027 lbs/h
NOx:1.47 lbs/h
CO: 0.02 lbs/h
Methanol: 0.003 lbs/h

Plant3:

Evaporation Rates: 1000 Kg/h
SO2: 0.1 lbs/h
Ammonia: 0.0662 lbs/h
NOx:1.53 lbs/h
CO: 0.45 lbs/h

8. BIOSOLIDS DRIED PRODUCT CONVEYING AND STORAGE

Conveying From Dryer to dry product bin

Handling Product: Municipal Sludge 10% wet
Conveyor Type: En Mass Chain Converyor
Material: Carbon Steel
Motor size: 1 HP
Length: 50'

Capital Cost of Equipments: 78 000 USD

Dry Product Buffer Bin:

Handling Product: Municipal Sludge 10% wet
Installation Location: Outdoor
Type: Bin with live bottom
Live bottom motors: 2x 0.5hp
Wet material Storage Material: Carbon Steel
Hopper Volume: 2.5 m^3 (90 ft^3)
Overall Dimensions: 5' length x 5' Wide x 4' Height

Capital Cost of Equipments: 70 000 USD

Conveying From dry product bin to Pyreg Unit

Handling Product: Municipal Sludge 10% wet
Conveyor Type: En Mass Chain Converyor
Material: Carbon Steel
Motor size: 1 HP
Length: 50' or 200'

Capital Cost of Equipments 50': 78 000 USD
Capital Cost of Equipments 200': 330 000 USD

9. BIOMASS WET PRODUCT CONVEYING AND STORAGE

Wet Product Buffer Bin:

Handling Product: Wood Chips 40% wet
Installation Location: Outdoor
Type: Chain hopper bin with live bottom feed screw
Live bottom motors: 1x 0.5hp and 1X10 hp and 2x3 HP
Wet material Storage Material: Carbon Steel
Hopper Volume: 100 m^3 (3500 ft^3)
Overall Dimensions: 32' length x 12' Wide x 9' Height

Capital Cost of Equipments: 525 000 USD

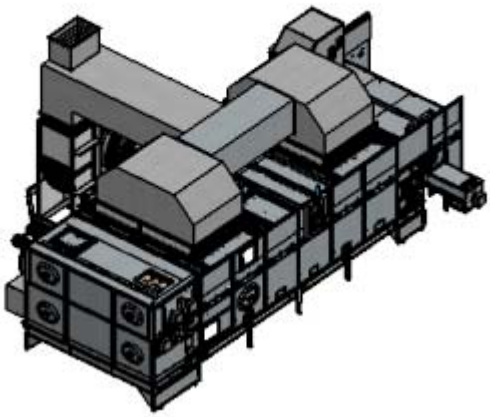
Conveying From wet product bin to Dryer Unit

Handling Product: Wood Chips 40% wet
Conveyor Type: Double Chain Conveyor
Material: Carbon Steel
Motor size: 2 HP
Length: 40'

Capital Cost of Equipments: 105 000 USD

10. BIOMASS DRYER

Dryer Model: BTL 1-3000-6 1/1
Installation Location: Indoor
Dryer Footprint Total: 7.8m witdh x 9m length x 4.4 m height (see attached layout drawing)
Drying Surface: 18 m^2
Thermal Requirements with hot water (140°C IN and 100°C OUT) : 900 KW
Electrical Load Connected: 85 KW
Electrical Load Consumption: 60 KW
Dryer Evaporation Rate: 850 Kg/h
Quantity Required: 2



Unit Price Capital Cost of Equipments: 610 000 USD

11. BIOMASS DRIED PRODUCT CONVEYING AND STORAGE

Conveying From Dryer to dry product bin

Handling Product: Wood Chips 10% wet
Conveyor Type: Double Chain Conveyor
Material: Carbon Steel
Motor size: 2 HP
Length: 50'

Capital Cost of Equipments: 115 000 USD

Dry Product Buffer Bin:

Handling Product: Wood Chips 10% wet
Installation Location: Outdoor
Type: Chain hopper bin with live bottom feed screw
Live bottom motors: 4x3hp and 1x5 HP
Wet material Storage Material: Carbon Steel
Hopper Volume: 28 m^3 (1000 ft^3)
Overall Dimensions: 22' length x 8' Wide x 6' Height

Capital Cost of Equipments: 242 000 USD

Conveying From dry product bin to Pyreg Unit

Handling Product: Municipal Sludge 10% wet
Conveyor Type: En Mass Chain Converyor
Material: Carbon Steel
Motor size: 1 HP
Length: 50' or 200'

Capital Cost of Equipments 50': 115 000 USD
Capital Cost of Equipments 200': 330 000 USD

12. TERMS AND PRICING

This is a BUDGET quotation.

Validity of the proposal: N/A

All prices are based on 2023 hourly rates.

Delivery: All items are Ex Works

Pricing for equipment only. No Mechanical nor Electrical Installation Quoted

Schedule:

Dryer:
Approx. 30 weeks on receipt of order, down payment, and approbation of drawings for readiness to ship from Europ.

Storage and Converying units:
Approx. 34 weeks on receipt of order, down payment, and approbation of drawings for readiness to ship from US or Canada.

Scrubber:
Approx. 34 weeks on receipt of order, down payment, and approbation of drawings for readiness to ship from US or Canada.

- **Selling prices and currency**

Equipment	Unit Price USD	Quantity	Total Price USD
Biosolids Line			
Cake Receiving Unit (700ft^3)	251 000 $	1	251 000 $
Cake Sludge Pumps	44 000 $	2	88 000 $
Biosolids Dryer+Back Mixing Unit	1 200 000 $	1	1 200 000 $
Biosolids Odor Control System	250 000 $	1	250 000 $
Biosolids Dried conveyor from Dryer to Product Bin	78 000 $	1	78 000 $
Biosolids Storage Bin (90ft^3)	70 000 $	1	70 000 $
Biosolids Dried conveyor from storage bin to Pyreg Unit	78 000 $	1	78 000 $
Engineering and Project Management			200 000$
Total Biosolids Line			2 215 000 $

Equipment	Unit Price USD	Quantity	Total Price USD
Biomass Line			
Wet Product Receiving Unit (3500ft^3)	525 000 $	1	525 000 $
Conveyor from Receiving Bin to Dryer	105 000 $	2	210 000 $
BioMass Dryer	610 000 $	2	1 220 000 $
Conveyor from Dryer to dry product bin	115 000$	2	230 000 $
Biomass Dry Storage Bin (1000 ft^3)	242 000 $	1	242 000$
Conveyor from dried product bin to Pyreg Units	115 000 $	2	230 000 $
Engineering and Project Management			260 000$
Total Biomass Line			2 917 000 $

- **Payment**

All payments must be made in accordance with the terms of payment presented in the following table.

EURO P. O	% of total price	Terms of Payment	
Release of P.O	20%	Net 0 days	
After Emission of Approval General Drawings	20%	Net 30 days	
Release of Manufacturing Drawings	20%	Net 30 days	
End of Fabrication	30%	Net 15 days	Payment needs to be received before the shipment is released. Buyer to issue an unconditional, irrevocable, and first-demand Bank Guarantee Letter corresponding to 10% of total contract value with a validity of at least 12 weeks following
Readyness to ship	10%	Net 30 days	
Total	100%		

We thank you for the opportunity you are offering us to bid on this project. We are confident that our proposal can respond competitively to the needs expressed in your Request for Proposals and we are eager to make your project a complete success.

Please do not hesitate to contact the undersigned for more information.

Cordially,

Lorenzo Borella
Division director
BERLIE TECHNOLOGIES INC.


PYREG
NET ZERO TECHNOLOGY

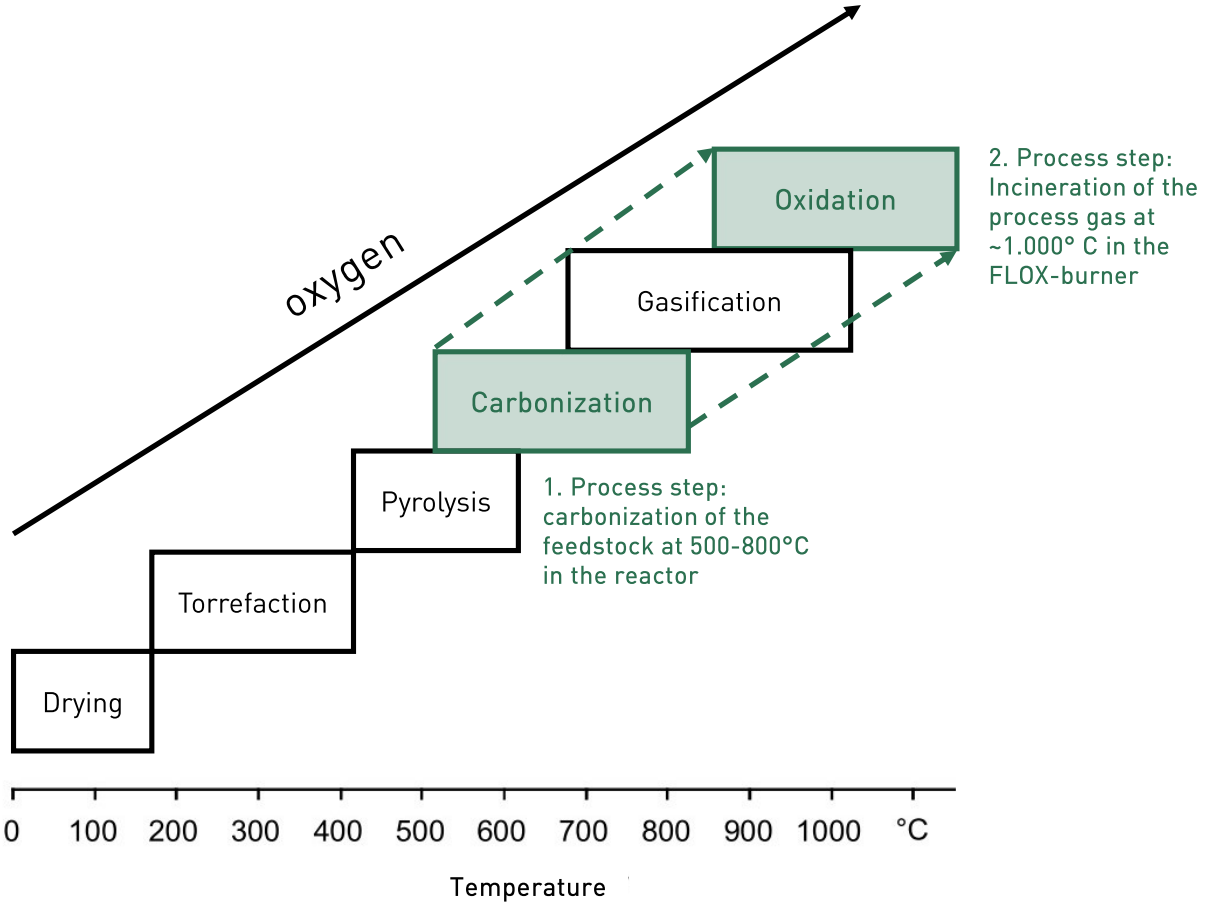
Technical delineation of PYREGs two step process

PYREG's carbonization process aims at the production of high-quality carbon products and/or the safe and residue free utilization of (hazardous) wastes/residues.

The PYREG-process does <u>not</u> aim at:

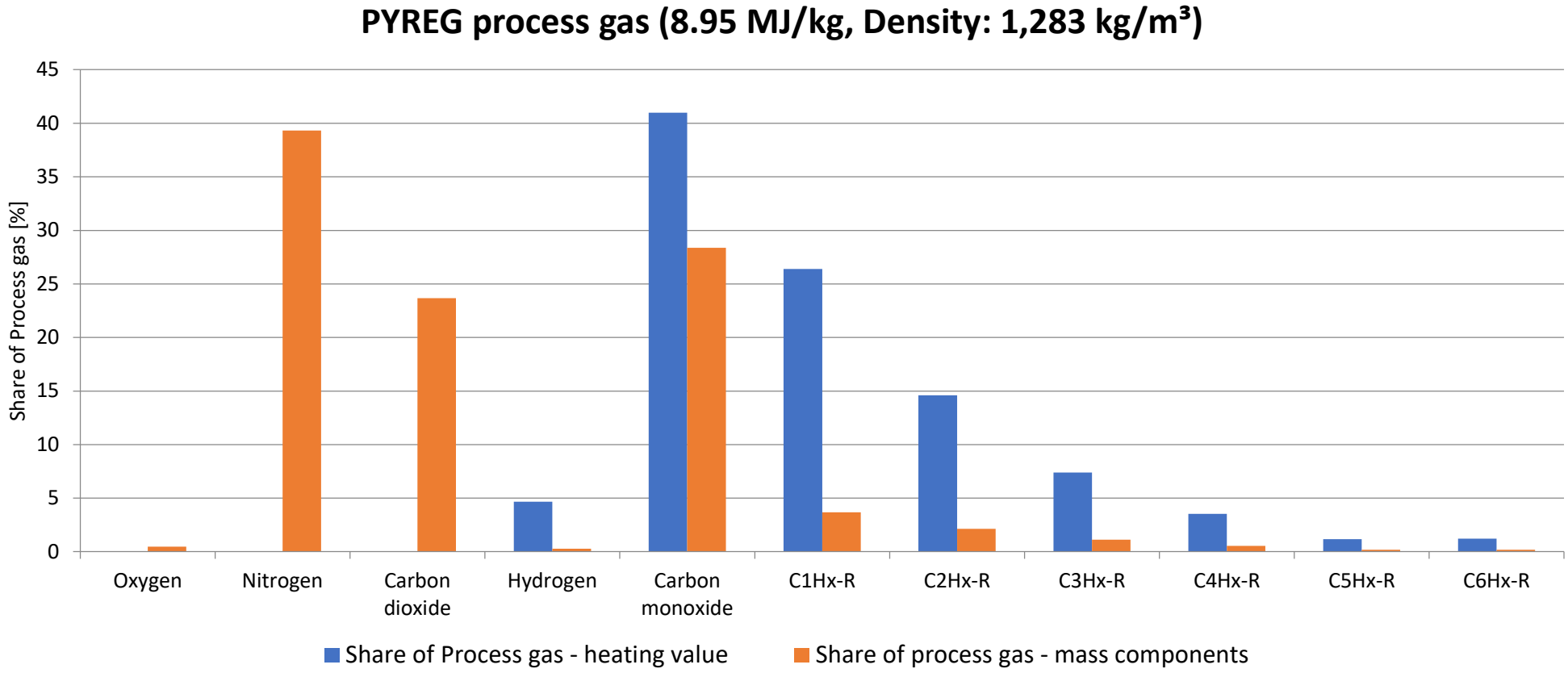
- increasing energy density (=torrefaction)
- condensation of the process gas to recover synthetic lubricants/fuels (=pyrolysis)
- energetic use of the gas to generate electricity (=gasification)

Parameter	unit	values
Pressure inside reactor	Pa	50...150
Pressure exhaust fans	Pa	> 3.000
Lambda reactor		0.1...0.4
Lambda combustion		1.05...1.2
Temperature reactor	°C	500...800
Temperature combustion	°C	850...1100
Temperature exhaust (chimney)	°C	60...300



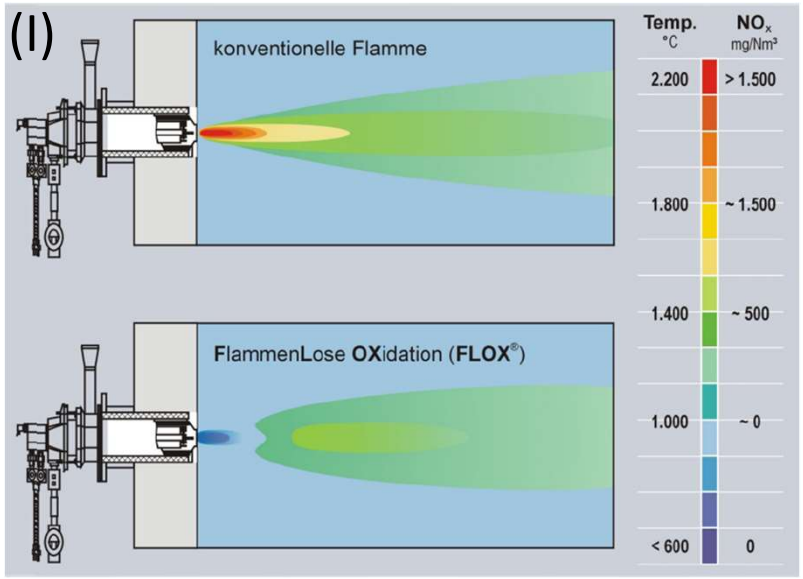
PYREG

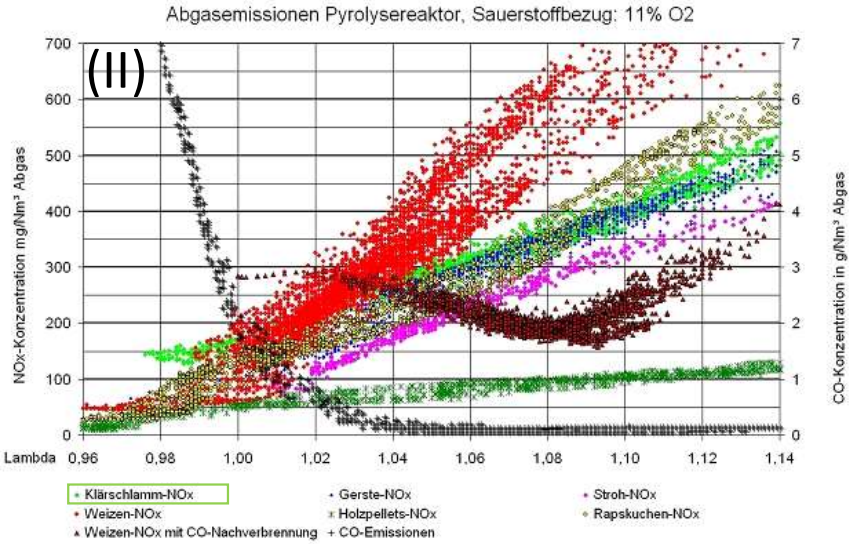
PYREG process gas analysis



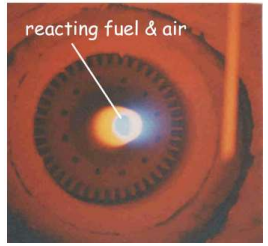
Notes:
- The process gas composition varies by biomass. The properties shown are from an average of 3 measurements.

FLOX-combustion

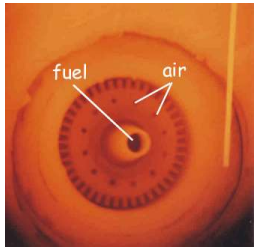




Flame burner



FLOX burner



- Flameless OXidation (FLOX) is a patented combustion principle to ensure lowest possible NOx emissions without secondary measures (SNCR or SCR) applied accordingly. The FLOX principle also aims at a full oxidation of all volatile compounds.
- Good combustion practice includes the consideration of Temperature, Turbulence and Time ("TTT rule"). The high velocity of added combustion air and exhaust gas recirculation allows a high turbulence and reduced temperature and time. The complete combustion of the gas is thus ensured.
- The illustration (I) above compares a conventional burner with a FLOX burner. The color indicated flame temperatures are put into comparison with associated NOx emission. High flame temperatures are leading to so called thermal NOx emissions. A lower flame temperature allows the almost complete reduction of thermal NOx emissions. Combustion temperatures of ca. 950 °C are sufficient to fulfill complete oxidation of all volatile or organic compounds. Lambda probes are available to regulate the system to Lambda values slightly above 1 to ensure lowest possible CO emissions as well. See Illustration (II), where different Biomasses results are shown. A Biosolids example (light green, circled) is also mentioned!
- The Pictures on the right are comparing a conventional Flame with a FLOX system.
- A combustion time of 2s, as for solids combustions (grate stoker furnaces) is not required, consequently.

Sources: https://flox.com/wp-content/uploads/2022/04/05_HTACG_FLOX.pdf
Journal für Terroirwein und Biodiversität, 2010, ISSN 1663-0521; https://www.ithaka-journal.net/pyrolsereaktor?lang=de

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PYREG organic hazardous substances emissions assessment

The sophisticated combustion system ensures a full oxidation (@ >850 °C) of organic hazardous compounds, including pharmaceuticals, microplastics and pathogens. The list below indicates the vaporization temperature of several relevant organic hazardous substances. They are all vaporized and safely extracted with carbonization temperatures of 550 °C and above.

#	Parameter	Formula	vaporization point [°C]	Chemistry	Assessment
1.	Acrolein	C3H4O	53	Organic	Destroyed by Oxidation
2.	Acrylonitrile	C3H3N	77	Organic	Destroyed by Oxidation
3.	Benzyl chloride	C7H7Cl	179	Organic	Destroyed by Oxidation
5.	Benzene	C6H6	80,1	Organic	Destroyed by Oxidation
7.	1,3-Butadiene	C4H6	- 4,4	Organic	Destroyed by Oxidation
10.	Ethylen dichlorid	C2H4Cl2	83,47	Organic	Destroyed by Oxidation
11.	PCDD/F	several	several	Organic	Combustion is not allowing "De-Novo Synthesis"
12.	Epichlorohydrin	C3H5ClO	117,9	Organic	Destroyed by Oxidation
13.	Ethylene oxid	C2H4O	10,7	Organic	Destroyed by Oxidation
14.	Formaldehyde	CH2O	-19	Organic	Destroyed by Oxidation
15.	Hydrogen cyanide	HCN	25,6	Organic	Destroyed by Oxidation
16.	Diphenylmethane diisocyanate	C15H10N2O2	314	Organic	Destroyed by Oxidation
18.	PAH*	several	several	Organic	Destroyed by Oxidation
19.	Pentachlorphenol	C6HCl5O	310	Organic	Destroyed by Oxidation
20.	Phosgene	COCl2	8,3	Organic	Destroyed by Oxidation
21.	Propylene oxide	C3H6O	34	Organic	Destroyed by Oxidation
22.	TDI	C9H6N2O2	251	Organic	Destroyed by Oxidation
23.	Trichloroethylene	C2HCl3	87,2	Organic	Destroyed by Oxidation
24.	Vinylchloride	C2H3Cl	-13,4	Organic	Destroyed by Oxidation

Notes:
* highest vaporization point is 547 °C (Anthanthen)

PYREG

EU Medium Combustion Plant Directive – limit values

Applying for plants with a thermal input of 1 -50 MW (Norm conditions: 273 K, 6% O2, dry, 1013 mbar)

Parameter	Unit	Woody biomass		Other biomass		Other liquid fuels	
		PX1500	PX6000	PX1500	PX6000	PX1500	PX6000
PM	mg/Nm^3	**50**	**30**	**50**	**30**	**50**	**30**
SO_2	mg/Nm^3	**-**	**-**	**200**	**200**	**400**	**400**
NO_x	mg/Nm^3	**500**	**300**	**500**	**300**	**500**	**300**

Source: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015L2193

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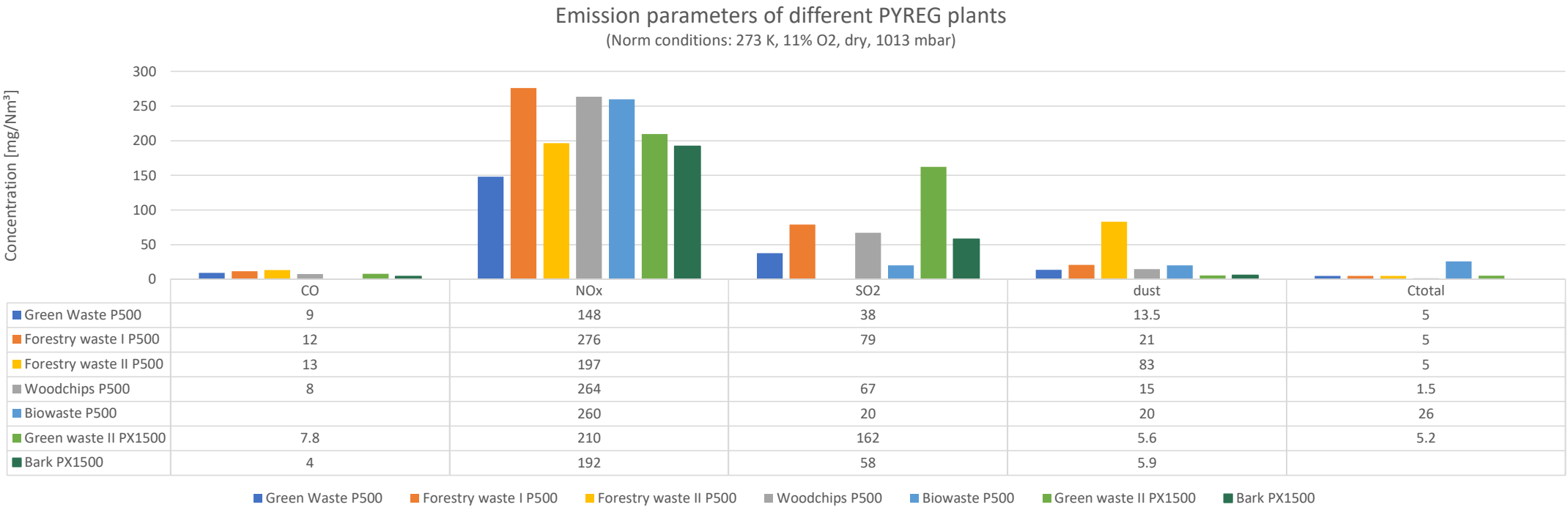
PYREG Emissions Reporting (from lignitic biomass sources)



	CO	NOx	SO2	dust	Ctotal
Green Waste P500	9	148	38	13.5	5
Forestry waste I P500	12	276	79	21	5
Forestry waste II P500	13	197		83	5
Woodchips P500	8	264	67	15	1.5
Biowaste P500		260	20	20	26
Green waste II PX1500	7.8	210	162	5.6	5.2
Bark PX1500	4	192	58	5.9	

Notes:

- The **Green Waste** values are based on municipal „household yard waste“ and land scaping companies; the feedstock was dried before shredding.
- The **Forestry Waste** values are based on Sieve leftovers from „whole-tree“ chip production (The trees are felled for undersize/thinning reasons).
- The **Woodchips** values are based on mixed wood without „fines“.
- The **Biowaste** values are based on a mixture (green and food waste from municipal collecting), after a pretreatment with pressing and drying. The biowaste was pretreated for material recovery reasons (liquid digestion).
- **Local requirements may vary!** Our customers are operating systems in according with their specific local requirements; hence, reported emissions of, for instance, NOx, vary. In case local requirements are stricter, additional emission control measures are available.

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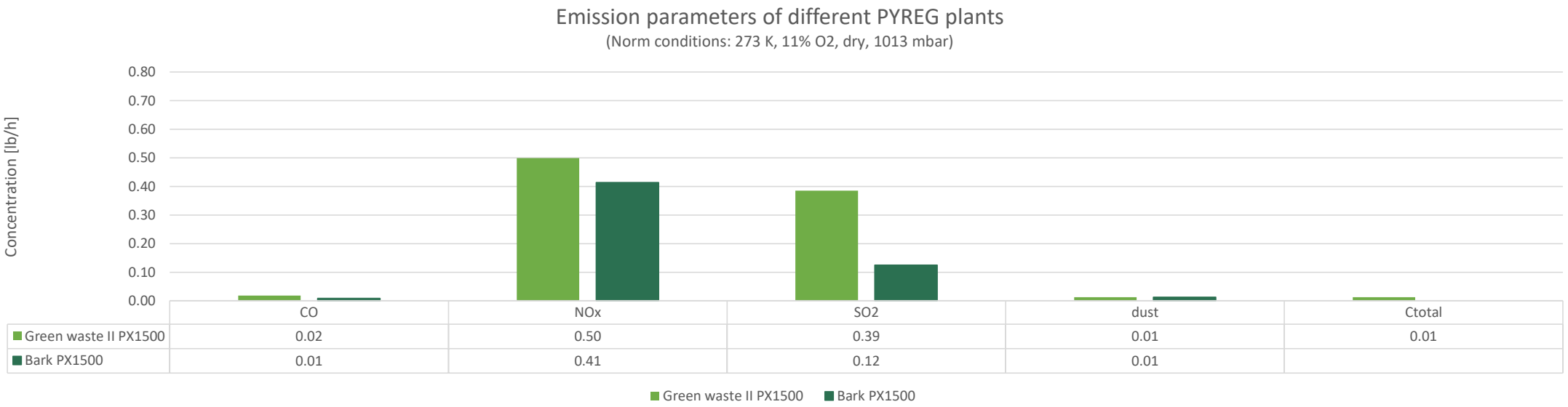
PYREG PX1500 Emissions Reporting [lb/h]

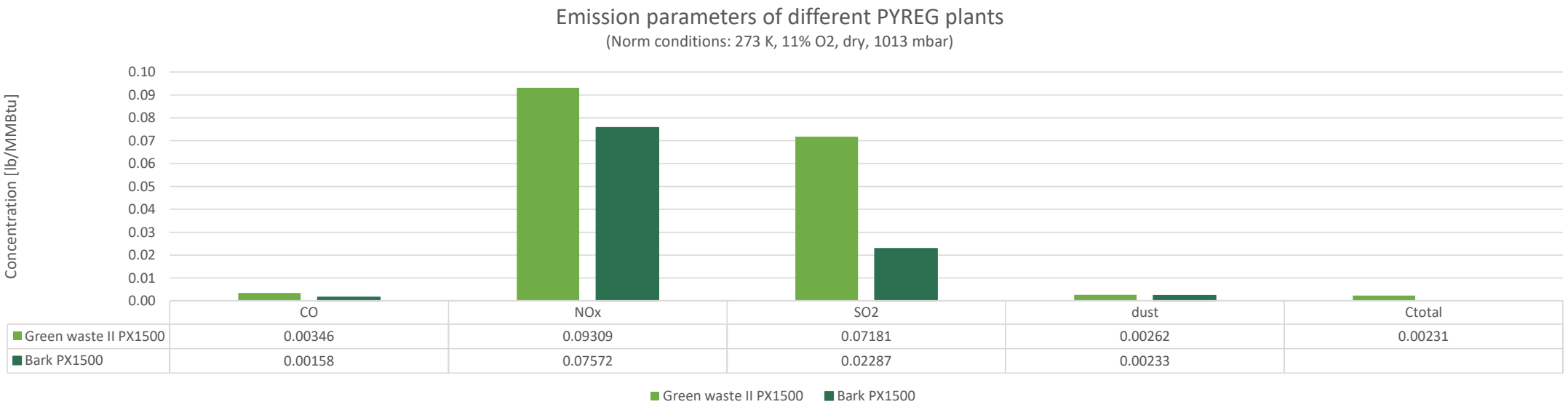


	CO	NOx	SO2	dust	Ctotal
Green waste II PX1500	0.02	0.50	0.39	0.01	0.01
Bark PX1500	0.01	0.41	0.12	0.01	

Notes:
- The **Green Waste** values are based on municipal yard waste from land scaping companies with an input fuel capacity of **5.36 MMBtu**
- The **Bark** values are based the bark of forest wood residues with an input fuel capacity of **5.46 MMBtu**

PYREG

PYREG PX1500 Emissions Reporting [lb/MMBtu]



	CO	NOx	SO2	dust	Ctotal
Green waste II PX1500	0.00346	0.09309	0.07181	0.00262	0.00231
Bark PX1500	0.00158	0.07572	0.02287	0.00233	

Notes:
- The **Green Waste** values are based on municipal yard waste from land scaping companies with an input fuel capacity of **5.36 MMBtu**
- The **Bark** values are based the bark of forest wood residues with an input fuel capacity of **5.46 MMBtu**

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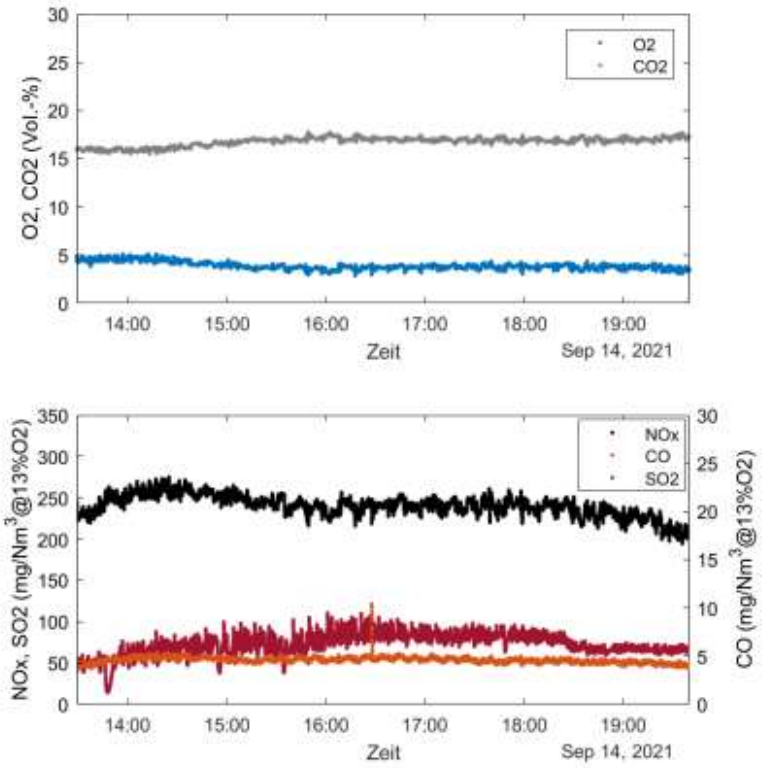
PYREG Emissions Reporting – Bark PX1500 (14.09.2021)

Measurements PYREG (Norm conditions: 273 K, 13% O2, dry, 1013 mbar)



Comparison of different systems

Parameter		Unit	Bark PyroTube	Bark Pyreg	Bark PyroFarm
O_2		Vol.-%	2.2	3.9	9.3
CO_2		Vol.-%	16.9	16.8	11.0
NO_X		mg/Nm³	363	240	572
SO_2		mg/Nm³	70	72	n.m.
CO		mg/Nm³	7	5	5
CH_4		mg/Nm³	< 1	3	12
Particle matter		mg/Nm³	n.m.	5.9	n.m.
PCDD/F	incl. LQ	ng/Nm³	n.m.	0.00085	n.m.
	excl. LQ	ng/Nm³	n.m.	0.00002	n.m.
Σ16 EPA PAH	incl. LQ	mg/Nm³	n.m.	0.00013	n.m.
	excl. LQ	mg/Nm³	n.m.	0.00012	n.m.

LQ: limit of quantification
n.m.: not measured

Source: PYROCHAR (2022): Erweiterung von Biomasse-Substraten für zusätzliche Energie- und Pflanzenkohleproduktion

PYREG

PX1500 NOx emissions projection (from lignitic biomass sources)

Lignitic and cellulosic biomasses usually have around 0,3 to 1,5 % N. The table below is based on the assumption of a woody forestry waste fraction. With such biomass, a NOx Concentration of 200 - 350 mg/m³, can be achieved.

Projected annual NOx emissions [kg NOx/a]

NOx conc. [mg Nox/Nm³] \ Exhaust flowrate [Nm³/h]	539	647	860	920	970	1.020	**1.078**	1.130	1.190	1.240	1.290
150	647	776	1.032	1.104	1.164	1.224	1.294	1.356	1.428	1.488	1.548
175	755	906	1.204	1.288	1.358	1.428	1.510	1.582	1.666	1.736	1.806
200	863	1.035	1.376	1.472	1.552	1.632	1.725	1.808	1.904	1.984	2.064
225	970	1.164	1.548	1.656	1.746	1.836	1.941	2.034	2.142	2.232	2.322
250	1.078	1.294	1.720	1.840	1.940	2.040	**2.156**	2.260	2.380	2.480	2.580
275	1.186	1.423	1.892	2.024	2.134	2.244	2.372	2.486	2.618	2.728	2.838
300	1.294	1.553	2.064	2.208	2.328	2.448	2.588	2.712	2.856	2.976	3.096
325	1.402	1.682	2.236	2.392	2.522	2.652	2.803	2.938	3.094	3.224	3.354
350	1.510	1.811	2.408	2.576	2.716	2.856	3.019	3.164	3.332	3.472	3.612
375	1.617	1.941	2.580	2.760	2.910	3.060	3.235	3.390	3.570	3.720	3.870

(Norm conditions: 273 K, 11% O2, dry, 1013 mbar)

Calculation example: $\frac{250\,\frac{mg}{Nm^3}}{1.000.000\,\frac{kg}{mg}} \times 1.078\frac{Nm^3}{h} \times 8.000\frac{h}{a} = 2.156\,kg\,NOx/a$

Notes:

- Each biomass will have a unique exhaust profile and flowrate (m³/h).
- Rows are rounded numbers in 5% intervals up/down of the expected flowrate
- Additional measures against NOx emission are available (SNCR and/or SCR), provided the above mentioned NOx emissions amounts are exceeding the annual thresholds of a region/country.

PYREG

PX1500 NOx emissions projection (from lignitic biomass sources)

Lignitic and cellulosic biomasses usually have around 0,3 to 1,5 % N.

The tables below are based on the given assumptions for concentration [mg/Nm³] as well as Exhaust flowrates [Nm³/h] and INPUT fuel power [kW].
Usually, PYREGs FLOX-Combustion is able to achieve NOx Concentrations of 200 - 350 mg/m³.

NOx emissions in lb/h

Concentration [mg NOx/Nm³ dry]	Exhaust Flowrate [Nm³/h dry]						
	700	800	900	1000	1100	1200	1300
100	0,154	0,176	0,198	0,220	0,243	0,265	0,287
150	0,231	0,265	0,298	0,331	0,364	0,397	0,430
200	0,309	0,353	0,397	0,441	0,485	0,529	0,573
250	0,386	0,441	0,496	0,551	0,606	0,661	0,717
300	0,463	0,529	0,595	0,661	0,728	0,794	0,860
350	0,540	0,617	0,694	0,772	0,849	0,926	1,003

(Norm conditions: 273 K, 11% O2, dry, 1013 mbar)

NOx emission concentrations in lb/MMBtu

INPUT fuel Power [kW]	Emissions [lb NOx/h]								
	0,400	0,450	0,500	0,550	0,600	0,650	0,700	0,750	0,800
1400	0,084	0,094	0,105	0,115	0,126	0,136	0,147	0,157	0,167
1450	0,081	0,091	0,101	0,111	0,121	0,131	0,141	0,152	0,162
1500	0,078	0,088	0,098	0,107	0,117	0,127	0,137	0,147	0,156
1550	0,076	0,085	0,095	0,104	0,113	0,123	0,132	0,142	0,151
1600	0,073	0,082	0,092	0,101	0,110	0,119	0,128	0,137	0,147
1650	0,071	0,080	0,089	0,098	0,107	0,115	0,124	0,133	0,142

(Norm conditions: 273 K, 11% O2, dry, 1013 mbar)

Color code explanation

Expectation	Range	Exception

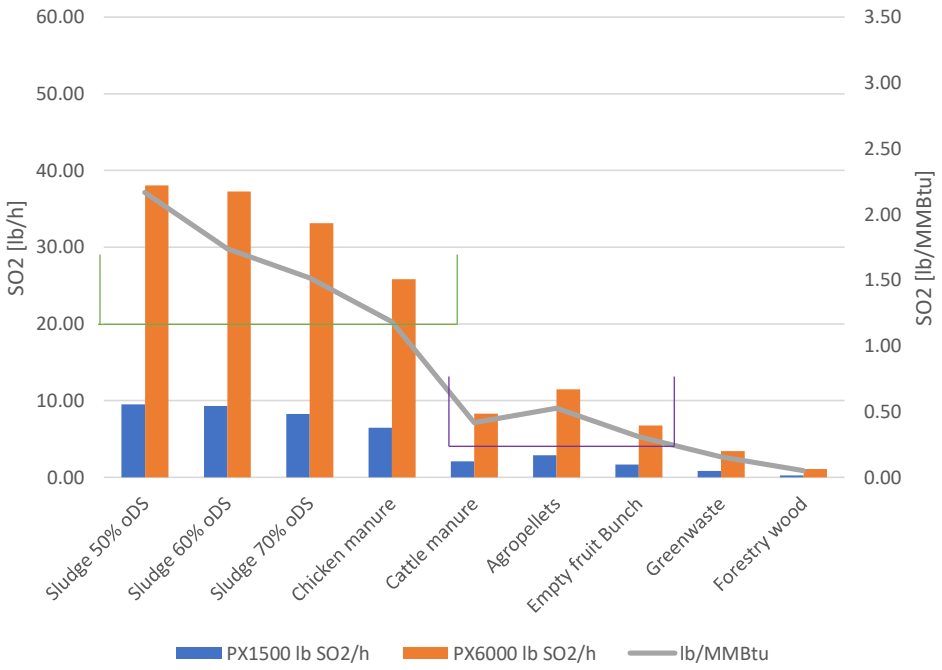
Notes:
- Each biomass will have a unique exhaust profile and flowrate (m³/h).
- Rows are rounded numbers in 5% intervals up/down of the expected flowrate
- Additional measures against NOx emission are available (SNCR and/or SCR), provided the above mentioned NOx emissions amounts are exceeding the annual thresholds of a region/country.

PYREG

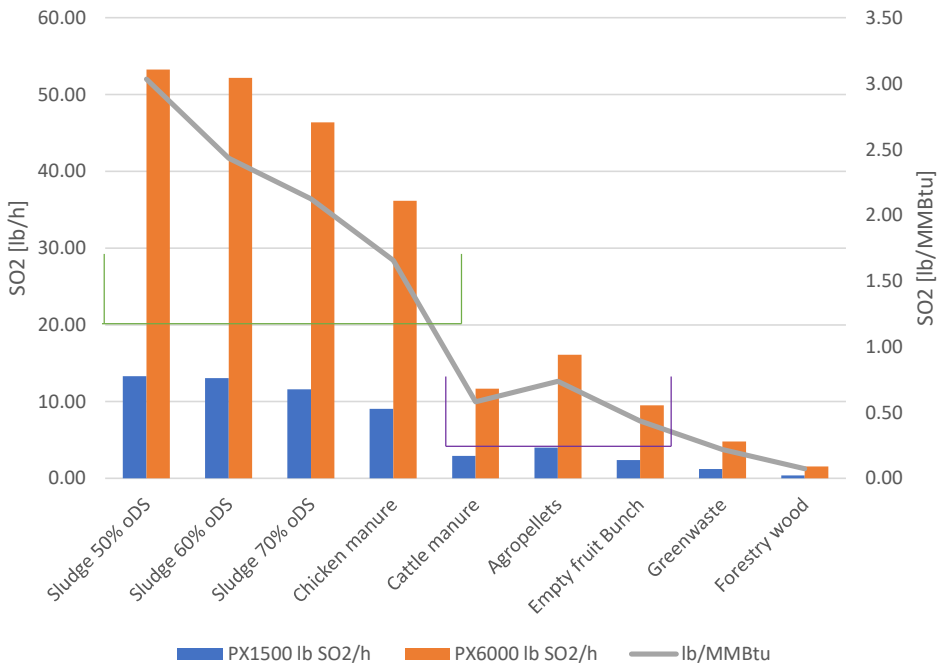
PX1500 SO_2 emissions projection for PX1500 and PX6000 (from various biomass sources)

Biomasses vary around 0,04 to 1% S in the DS. The tables below are based on the assumption of sulphur going into to the gaseous phase by 50% (I) and 70% (II)

I



II



Notes:

- Each biomass will have a unique exhaust profile and flowrate (m^3/h).
- Additional measures against SOx emission are available, if a reduction is required by the air permit:
  - Tier 1 could require a wet scrubbing system, available by PYREG
  - Tier 2 could require a precipitation in the stack by third party or, alternatively adding lime with a dosing station, available by PYREG.

(Norm conditions: 273 K, 11% O2, dry, 1013 mbar)

PYREG

E. Evidence of Workman's Compensation Insurance

(TBD)

ALLEGANY · COUNTY ·

Department of Planning & Zoning
Office of Zoning Administration

David J. Caporale, President
William R. Atkinson, Commissioner
Creade V. Brodie, Jr., Commissioner
Jason M. Bennett, C.P.A., Administrator

T. Lee Beeman, Esq. Attorney
James Squires, Director P&Z
Jerrod Cook, Planner P&Z

Thursday, January 4, 2024

Adam Strott
Economic Development Specialist
701 Kelly Road
Cumberland, MD 21502

Re: Zoning Certification

To Whom It May Concern:

Pursuant to your recent zoning certification request, the County owned property located in Mexico Farms known by Tax Id #01-16-014567 and owned by the Allegany County Commissioners has been researched as follows. The following comments have been generated;

i. There is no known zoning or building code violations at this site.
ii. No address is currently assigned to this site.
iii. The property is zoned "I" industrial and permits recycling use so long as current standardized Environmental and Zoning regulations are met.
iv. The aforementioned property appears to be contained on the parcel designated within the 2023 Tax Records of Allegany County, Maryland, as Map 50, Grid 19, Parcel 125 and encompasses 7.67 acres.

If anyone should have any questions or need further assistance on this record, they may contact the Land Development Services Office at 301-777-9544.

Sincerely,

Jerrod Cook
Planner

County Office Complex -701 Kelly Road
Cumberland, Maryland 21502-3401
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