RAMBOLL

ENVIRONMENT
& HEALTH

Mr. William Willets, PE
Chief, Permitting Section, Division of Air Quality
NC Department of Environmental Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

Re: Initial Title V Air Permit Application Update
Enviva Pellets Northampton, LLC
Garysburg, North Carolina
Northampton County
Facility ID: 6600167

Date November 18, 2020

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Dear Mr. Willets:

Enclosed, please find three (3) copies of the updated initial Title V Air Permit Application for Enviva Pellets Northampton, LLC (Enviva) (NC DEQ Facility ID #6600167) in Northampton County. The facility currently operates under Air Quality Permit No. 10203R07 ("Permit R07") issued by the North Carolina Department of Environmental Quality (NCDEQ), Division of Air Quality (DAQ) on October 21, 2020. As required under 15A NCAC 2Q .0501, Enviva submitted an initial Title V Air Permit application for its Northampton plant on April 22, 2014, within 12 months of commencing operation of the facility. The initial Title V application was updated on August 9, 2016 to reflect changes associated with Air Quality Permit No. 10203R04 issued on October 12, 2015 and again on January 21, 2020 to reflect changes associated with Air Quality Permit No. 10203R06 issued on October 30, 2019. It was then updated on April 3, 2020, as instructed by DAQ, to reflect the February 5, 2020 permit modification application. To date, a Title V permit has not been issued for the Northampton plant.

Enviva is submitting this updated initial Title V Permit application for the Northampton plant within 30 days of issuance of Permit R07 as required by Condition 2.2.A.11 of the permit to reflect all changes authorized in Permit R07. This Title V permit application replaces all previously submitted Title V permit applications for the Northampton plant. Pursuant to 15A NCAC 02Q .0507(d) and consistent with NCDEQ guidance, initial Title V applications without modifications are not required to include a zoning consistency determination.

Thank you for your prompt attention to this matter. If you have any questions regarding this request, please contact me at (225) 408-2691 or Kai Simonsen, Air Quality Engineer at Enviva, at (984) 789-3628.

Yours sincerely,

Michael Carbon
Managing Principal

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cc: Steven Van Ootegham (Enviva)
Yana Kravtsova (Enviva)
Stephen Stroud (Enviva)
Kai Simonsen (Enviva)

Enclosures: Permit Application including Appendices

Prepared for
Enviva Pellets Northampton, LLC
Northampton County, North Carolina

Prepared By
Ramboll US Consulting, Inc.
Baton Rouge, Louisiana

Project Number
1690014763-021

Date
November 2020

INITIAL TITLE V AIR PERMIT APPLICATION UPDATE

ENVIVA PELLETS NORTHAMPTON, LLC

RAMBOLL

CONTENTS

LIST OF TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AP-42	Compilation of Air Pollutant Emission Factors
BMP	Best Management Practice
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
CFR	Code of Federal Regulations
CI	Compression Ignition
CO	Carbon Monoxide
DAQ	Division of Air Quality
EPA	U.S. Environmental Protection Agency
FSC	Forest Stewardship Council
g	gram
HAP	Hazardous Air Pollutant
hp	horsepower
ICE	Internal Combustion Engine
lb	Pound
kW	kilowatt
MACT	Maximum Achievable Control Technology
MMBtu	Million British thermal units
NAAQS	National Ambient Air Quality Standards
NCAC	North Carolina Administrative Code
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMHC	Non-methane Hydrocarbons
NNSR	Nonattainment New Source Review
NO_X	Nitrogen Oxides (NO + NO_2)
NSPS	New Source Performance Standards
NSR	New Source Review
ODT	Oven Dried Short Tons
OSB	Oriented Strandboard
PEFC	Programme for the Endorsement of Forest Certifications
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter Less Than 2.5 Micrometers in Aerodynamic Diameter
PM_{10}	Particulate Matter Less Than 10 Micrometers in Aerodynamic Diameter
ppmw	parts per million by weight
PSD	Prevention of Significant Deterioration
PSEU	Pollutant Specific Emission Unit
RICE	Reciprocating Internal Combustion Engine
RCO	Regenerative Catalytic Oxidizer
RTO	Regenerative Thermal Oxidizer
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SFI	Sustainable Forestry Initiative
TAP	Toxic Air Pollutant
tph	tons per hour
tpy	tons per year
USEPA	US Environmental Protection Agency
VOC	Volatile Organic Compounds

WESP	Wet Electrostatic Precipitator
yr	year

1. INTRODUCTION

Enviva Pellets Northampton, LLC (Enviva) owns and operates a wood pellet manufacturing plant (referred to herein as "the Northampton plant", "the plant", or "the facility") in Northampton County, North Carolina. The plant currently operates under Air Quality Permit No. 10203R07 ("Permit R07") issued by the North Carolina Department of Environmental Quality (NCDEQ), Division of Air Quality (DAQ) on October 21, 2020. The plant consists of the following processes: Log Chipper, Bark Hog, Green Wood Hammermills, Rotary Dryer, Dry Hammermills, Pellet Presses and Coolers, Product Loadout operations and other ancillary activities.

As required under 15A NCAC 2Q .0501, Enviva submitted an initial Title V Air Permit Application for the Northampton plant on April 22, 2014, within 12 months of commencing operation of the facility. The initial Title V application was updated on August 9, 2016 to reflect changes associated with Air Quality Permit No. 10203R04 issued on October 12, 2015 and again on January 21, 2020 to reflect changes associated with Air Quality Permit No. 10203R06 issued on October 30, 2019. It was then updated on April 3, 2020, as instructed by DAQ, to reflect the February 5, 2020 permit modification application. To date, a Title V permit has not been issued for the Northampton plant.

Enviva is submitting this updated initial Title V Permit application for the Northampton plant within 30 days of issuance of Permit R07 as required by Condition 2.2.A.11 of the permit to reflect all changes authorized in Permit R07. This Title V permit application replaces all previously submitted Title V permit applications for the Northampton plant.

A description of the process is provided in Section 2 and methodologies used to quantify potential emissions are summarized in Section 3. Section 4 describes the applicability of federal and state permitting programs. Section 5 includes a detailed applicability analysis of both federal and state regulations. An area map and process flow diagram are included in Appendices A and B, respectively. Detailed potential emissions calculations are provided in Appendix C. Finally, the completed air permit application forms are included in Appendix D.

2. PROCESS DESCRIPTION

Enviva manufactures wood pellets for use as a renewable fuel for energy generation and industrial customers. Enviva's customers use wood pellets in place of coal, significantly reducing emissions of pollutants such as lifecycle CO_2/greenhouse gases, mercury, arsenic and lead. The company is dedicated to improving the environmental profile of energy generation while promoting sustainable forestry in the southeastern United States. Enviva holds certifications from the Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), Programme for the Endorsement of Forest Certification (PEFC), and Sustainable Biomass Program (SBP). Enviva requires that all suppliers adhere to state-developed "Best Management Practices" (BMPs) in their activities to protect water quality and sensitive ecosystems. In addition, Enviva is implementing an industry leading "track and trace" system to further ensure that all fiber resources come from responsible harvests. Enviva pays particular attention to: land use change, use and effectiveness of BMPs, wetlands, biodiversity, and certification status. All of this combined ensures that Enviva's forestry activities contribute to healthy forests both today and in the future. A detailed description of Enviva's Responsible Wood Supply Program can be found at: https://www.envivabiomass.com/sustainability/responsible-sourcing/responsible-sourcing-policy/

The following sections provide a description of the Northampton plant. An area map and process flow diagram are provided in Appendices A and B, respectively.

2.1 Green Wood Handling and Storage (ES-GWHS)

"Green" (i.e., fresh cut) wood is delivered to the plant via trucks as either pre-chipped wood or whole logs from commercial harvesting for on-site chipping. Pre-chipped wood is screened to remove oversize material which goes to the furnace fuel pile and acceptably sized chips are conveyed to storage piles. Logs are debarked and chipped in the Debarker (IES-DEBARK) and Chipper (IES-EPWC). Chipped wood for drying is conveyed to a chipped wood storage pile and bark is conveyed to a bark fuel storage pile. All transfer points and storage piles are captured by the Green Wood Handling and Storage source (ES-GWHS).

2.2 Debarking (IES-DEBARK), Chipping (IES-EPWC), Bark Hog (IES-BARK), and Green Wood Fuel Storage Bins (IES-GWFB)

Logs are debarked by the electric-powered rotary drum Debarker (IES-DEBARK) and then sent to the electric powered green wood chipper (IES-EPWC) to chip the wood to acceptable size. The chips are then routed to Green Wood Storage Piles. Purchased chips received by three (3) truck dumps are also transferred to Green Wood Storage Piles. Bark from the Debarker is hogged (IES-BARK) and transferred to the Bark Fuel Storage Piles along with purchased bark/fuel chips received via truck dump or walking floor trailers. Following storage in the Bark/Fuel Chip Storage Piles, the bark/fuel chips are transferred to a blend pile, then transferred via walking floor to a covered conveyor, and finally to an enclosed Green Wood Fuel Storage Bin (IES-GWFB) where the material is pushed into the furnaces.

2.3 Green Hammermills (ES-GHM-1 through ES-GHM-5)

Prior to drying, chips from the Green Wood Storage Piles are processed in the Green Hammermills to reduce material to the proper size. Exhaust from the five (5) new closed-loop green hammermills (ES-GHM-1 through ES-GHM-5) will be routed to the existing WESP (CD-WESP-1) and then routed to a Regenerative Thermal Oxidizer (CD-RTO-1) for further emissions control prior to being released into the atmosphere. The Green Hammermills will also have the ability to be routed to and controlled by the Dryer #2, WESP (CD-WESP-2) and RTO (CD-RTO-2), once constructed, when the Dryer #1, WESP (CD-WESP-1) and RTO (CD-RTO-1) are shut down.

2.4 Dryers (ES-DRYER-1 and ES-DRYER-2) and Double Duct Burners (IES-DDB-1 through IES-DDB-4)

Dryer #1 (ES-DRYER-1) uses direct contact heat provided to the system via a 175.3 million British thermal unit per hour (MMBtu/hr) total heat input furnace that uses bark and wood chips as fuel. Green wood is fed into the dryer where the moisture content is reduced to the desired level and routed to a multi-clone separator, consisting of three identical material handling cyclones that remove wood fiber from the dryer exhaust gas. Emissions from each cyclone are combined into a common duct and are routed to the WESP (CD-WESP-1) for particulate, metallic HAP, and hydrogen chloride removal. Exhaust from the WESP will then be routed to an RTO (CD-RTO-1) for additional VOC control.

A second direct contact rotary dryer system (ES-DRYER-2) will also be equipped with a WESP (CD-WESP-2) and RTO (CD-RTO-2) for the same emissions control described above for Dryer #1. Dryer #2 and its associated control equipment are authorized for construction and operation in Northampton's current air permit, 10203R07. The new dryer, similar to the existing dryer, will use direct contact heat provided to the system via a 180 MMBtu/hr total heat input furnace that uses bark and fuel chips as fuel.

As flue gas exits the dryers and begins to cool, wood tar can condense and coat the inner walls of the dryer ducts creating a risk of fire. To prevent condensation from occurring and thus reduce the risk of fire, each dryer system will include double ducts which will be heated. The duct from the cyclone outlet to the ID fan will be heated by one low-NOx burner with a maximum heat input rating of 2.5 MMBtu/hr and a second 2.5 MMBtu/hr low-NOx burner will heat the duct used for exhaust gas recirculation and the WESP. The double duct burners (IES-DDB-1 through IES-DDB-4) are Title V insignificant activities and will combust natural gas, or propane as back-up, and exhaust directly to atmosphere.

2.5 Bypass Stacks (ES-DRYERBYP-1, ES-DRYERBYP-2, ES-FURNACEBYP-1, ES-FURNACEBYP-2)

The Furnace Bypass stacks (ES-FURNACEBYP-1 and ES-FURNACEBYP-2) are used to exhaust hot gases during start-ups (for temperature control) and planned shutdowns. Specifically, the Furnace Bypass Stacks are used in the following situations:

- **Cold Start-ups:** The furnace bypass stacks are used when the furnace is started up from a cold shutdown until the refractory is sufficiently heated and can sustain operations at a low level. The bypass stack is then closed, and the furnace is slowly brought up to a normal operating rate. Diesel fuel may be used as an accelerant for cold start-up and the

amount used per event is typically 15 – 30 gallons. Annual diesel fuel usage is typically 100 – 200 gallons and emissions resulting from diesel combustion are insignificant.

- **Planned Shutdown:** In the event of a planned shutdown the furnace heat input is decreased, and all remaining fuel is moved through the system to prevent a fire during the shutdown period. The remaining fuel is combusted prior to opening the furnace bypass stack. The furnace bypass stack is not utilized until after the furnace achieves an idle state (10 MMBtu/hr or less). Until this time, emissions continue to be controlled by the WESP and RTO.

- **Idle Mode:** The purpose of operation in "idle mode" is to maintain the temperature of the fire brick lining the furnaces which may be damaged if it cools too rapidly. Operation in "idle mode" also significantly reduces the amount of time required to restart the dryers.

Use of the Furnace Bypass Stacks for start-up and shutdowns is limited to 50 hours per year. Each furnace may also operate up to 500 hours per year in "idle mode" with emissions routed to the Furnace Bypass Stacks.

2.6 Dried Wood Handling (ES-DWH-1 and ES-DWH-2), Dry Shavings Reception and Handling (ES-DSR, IES-DRYSHAVE), Dry Hammermill Pre-screeners (ES-PS-1 and ES-PS-2), Dry Hammermills (ES-HM-1 through ES-HM-8), Dry Line Conveyor (ES-DLC-1), Dry Line Hopper (IES-DLH), Dry Shavings Hammermills (ES-DSHM-1 and 2) and Dry Shavings Silo (ES-DSS)

Dried materials from the Dryer material recovery cyclones are conveyed to screening operations that remove smaller wood particles which bypass the Dry Hammermills. The Dried Wood Handling emission sources each include partially enclosed conveyor systems and conveyor transfer points located after each dryer (ES-DWH-1 and ES-DWH-2). Emissions associated with ES-DWH-1 are controlled by a passive bin vent (CD-DWH-BV) and emissions associated with ES-DWH-2 will be controlled by a baghouse (CD-DWH-BF-2).

Pre-screening may be accomplished with two (2) existing pre-screeners (ES-PS-1 and ES-PS-2). Oversized wood is diverted to one of eight (8) Dry Hammermills (ES-HM-1 through ES-HM-8) for further size reduction prior to pelletization. Each Dry Hammermill includes a product recovery cyclone (CD-HM-CYC-1 through CD-HM-CYC-8) which is routed to one of three (3) baghouses (CD-HM-BF-1 through CD-HM-BF-3) for particulate matter control. A portion of the exhaust exiting the product recovery cyclones will be recirculated back to the front end of the Dry Hammermills and the remaining exhaust stream will be routed through the three (3) baghouses (CD-HM-BF-1 through CD-HM-BF-3) to a quench duct for fire safety and then to either the Dryer #1 (ES-DRYER-1) furnace, the Dryer #1 WESP (CD-WESP-1), or a combination of the two, and then to the Dryer #1 RTO (CD-RTO-1) to control VOC and HAP emissions. Note, the quench duct is being installed for safety purposes to reduce the risk of fire and is not considered a control device. Material from the dry hammermill cyclones as well as smaller particles that pass through the pre-screeners are transferred to the Dry Hammermill system discharge collection enclosed drag chain conveyor, and then to the Pellet Mill Feed Silo infeed screw via enclosed drag chain conveyors to be made into pellets.

Purchased dry shavings are also used to produce wood pellets in addition to green chips or logs, forgoing the drying process and thus minimizing on-site VOC and HAP emissions. Currently, the plant receives dry shavings at the bark truck dump where they are moved to an

open dry shavings pile via front end loader or are received via walking floor trailer at the pile. Dry shavings are added to the existing Dry Line Hopper (IES-DLH) and subsequently transferred to the dry hammermill pre-screeners via the existing Dry Line Feed Conveyor (ES-DLC-1) and dry hammermill feed conveyor. These transfer activities make up the existing Dry Shaving Material Handling and Storage (IES-DRYSHAVE) emission source that is used for feeding pre-dried materials. Particulate emissions from Dry Shavings Reception (ES-DSR) will be controlled by the Dry Shavings Reception baghouse (CD-DSR-BF).

A new Dry Shavings Silo (IES-DSS) will be used to store dry shavings used in pellet production. The purchased dry shavings will be unloaded from trucks via a truck dump into a hopper that feeds material via enclosed conveyors to a bucket elevator that ultimately fills a silo. From the silo, the dry shavings will then be transferred via an enclosed conveyor to the Dry Shavings Hammermills (ES-DSHM-1 and ES-DSHM-2) for additional processing. Milled dry shavings will then be transferred to the Pellet Mill Feed Silo. The dry shavings hammermill exhaust will be routed to a baghouse (CD-HM-BF-3) and then to a quench duct for fire safety and then to either the Dryer #1 (ES-DRYER-1) furnace, the Dryer #1 WESP (CD-WESP-1), or a combination of the two, and then to the Dryer #1 RTO (CD-RTO-1) for control of VOC and HAP emissions. Note, the quench duct is being installed for safety purposes to reduce the risk of fire and is not considered a control device.

2.7 Pellet Mill Feed Silo (ES-PMFS) and Pellet Cooler HP Fines Relay System (ES-PCHP)

Milled wood from the Dry Hammermill material recovery cyclones is transported by a set of conveyors to the Pellet Mill Feed Silo (ES-PMFS) prior to pelletization. Particulate emissions from the Pellet Mill Feed Silo are controlled by a bin vent filter (CD-PMFS-BV).

Fines from Finished Product Handling (ES-FPH) are collected by the Pellet Cooler HP Fines Relay System (ES-PCHP) which is controlled by a baghouse (CD-PCHP-BV). The Pellet Cooler HP Fines Relay System transfers this material to the Pellet Mill Feed Silo (ES-PMFS).

2.8 Additive Handling and Storage (IES-ADD)

Additive may be used in pellet production to act as a lubricant for the dies and increase the durability of the final product. The additive is received in 500 lb supersacks and is emptied into a hopper. The additive is transferred from the hopper via enclosed screw conveyor and is added to milled wood from the Pellet Mill Feed Silo discharge screw conveyor prior to transfer to the Pellet Presses. The additive contains no hazardous chemicals or VOCs.

2.9 Pellet Press System and Pellet Coolers (ES-CLR-1 through ES-CLR-6)

Dried processed wood is mechanically compacted through twelve (12) presses in the Pellet Press System. Exhaust from the Pellet Press System and Pellet Press conveyors is vented through the Pellet Cooler aspiration material recovery cyclones and emission controls as described below, and then to the atmosphere. Formed pellets are discharged into one of six (6) pellet coolers (ES-CLR-1 thru ES-CLR-6). Chilled cooling air is passed through the pellets. At this point, the pellets contain a small amount of wood fines, which are swept out with the cooling air and are controlled utilizing six (6) cyclones (CD-CLR-1 thru CD-CLR-6). VOC and organic HAP emissions will be controlled by an RTO/RCO (CD-RCO-2).

A quench duct will be installed prior to RTO/RCO (CD-RCO-2) for safety purposes to reduce the risk of fire and is not considered a control device. The quench duct is inherent for the RTO/RCO (CD-RCO-2) to operate safely (protection from fire). A safety interlock will be installed to cease operation of the pellet presses and pellet coolers if a minimum flowrate is not maintained.

2.10 Finished Product Handling (ES-FPH) and Loadout (ES-PL-1, ES-PL-2, ES-PB-1 through ES-PB-12)

Final product is conveyed to pellet loadout bins (ES-PB-1 through ES-PB-12) that feed pellet truck loadout operations (ES-PL-1 and ES-PL-2). Pellet loadout is accomplished by gravity feed of the pellets through a covered chute to reduce emissions. Emissions from pellet loadout are minimal because dried wood fines will have been removed by the pellet screeners, and a slight negative pressure is maintained in the loadout area as a fire prevention measure to prevent any build-up of dust on surfaces within the building. This slight negative pressure is produced via an induced draft fan that exhausts to the Finished Product Handling baghouse (CD-FPH-BF). This baghouse controls emissions from Finished Product Handling (ES-FPH) and the Pellet Loadout Bins (ES-PB-1 through ES-PB-12). Fine material from loadout operations is transferred to the Pellet Mill Feed Silo (ES-PMFS).

2.11 Emergency Generators (IES-GN-1 and IES-GN-2), Fire Water Pump Engine (IES-FWP), and Diesel Storage Tanks (IES-TK-1 through IES-TK-4)

The plant has a 350 horsepower (hp) diesel-fired Emergency Generator (IES-GN-1) for emergency operations and a 300 hp diesel-fired Fire Water Pump Engine (IES-FWP). Aside from maintenance and readiness testing, the generator and Fire Water Pump Engine are only utilized for emergency operations. Diesel for the IES-GN-1 is stored in a tank of up to 2,500 gallons capacity (IES-TK-1) and diesel for the fire water pump engine is stored in a storage tank of up to 500 gallon capacity (IES-TK-2).

A 671 hp diesel-fired Emergency Generator (IES-GN-2) is required to support operations of the facility, and diesel for IES-GN-2 is stored in a 1,000 gallon diesel storage tank (IES-TK-4). The plant also includes a diesel storage tank with a capacity of up to 5,000 gallons that is used for distributing diesel fuel to mobile equipment (IES-TK-3).

2.12 Propane Vaporizer (IES-PVAP)

A direct-fired propane vaporizer (IES-PVAP) may be used to vaporize liquid propane for combustion by the RTO burners, RTO/RCO burners, and double duct burners (IES-DDB-1 through IES-DDB-4). The vaporizer will have a maximum heat input capacity of 1 MMBtu/hr and will combust propane. Propane may be used until natural gas service is available to the facility, after which natural gas will be the primary fuel for all burners with propane used as a back-up fuel.

3. POTENTIAL EMISSIONS QUANTIFICATION

The following summarizes data sources and calculation methodologies used in quantifying potential emissions from the Northampton plant. Detailed potential emissions calculations are provided in Appendix C. Note that Enviva has quantified potential greenhouse gas (GHG) emissions from all applicable emissions sources; however, GHG emission are not discussed in detail below. Please refer to the detailed emission calculations provided in Appendix C for GHG emission estimates.

3.1 Green Wood Handling and Storage (ES-GWHS)

Fugitive PM emissions result from unloading purchased chips and bark from trucks into hoppers and the transfer of these materials to storage piles via conveyors. Fugitive PM emissions from chip and bark transfer operations were calculated based on AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles*.[1] Detailed potential emission calculations are included in Appendix C.

3.2 Green Wood Storage Piles and Bark Fuel Storage Piles (ES-GWHS)

Particulate emission factors used to quantify emissions from storage pile wind erosion for the four (4) Green Wood Storage Piles and three (3) Bark Fuel Storage Piles were calculated based on USEPA's *Control of Open Fugitive Dust Sources*.[2] The number of days with rainfall greater than 0.01 inch was obtained from AP-42 Section 13.2.2, *Unpaved Roads*[3], and the percentage of time that wind speed exceeds 12 miles per hour (mph) was determined based on the AERMOD-ready meteorological dataset for the Maxton National Weather Service (NWS) Station provided by DAQ[4]. The mean silt content of 8.4% for unpaved roads at lumber mills from AP-42 Section 13.2.2 was conservatively applied in the absence of site-specific data. The exposed surface area of the pile was calculated based on worst-case pile dimensions.

VOC emissions from storage piles were quantified based on the exposed surface area of the pile and emission factors from the National Council for Air and Stream Improvement (NCASI). NCASI emission factors range from 1.6 to 3.6 pounds (lb) VOC as carbon/acre-day; however, emissions were conservatively based on the maximum emission factor. Detailed potential emission calculations are included in Appendix C.

3.3 Debarker (IES-DEBARK) and Bark Hog (IES-BARK)

PM emissions occur as a result of log debarking and processing. Potential PM emissions from debarking and the bark hog were quantified based on emission factors from EPA's *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air*

[1] USEPA AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles* (11/06).

[2] USEPA *Control of Open Fugitive Dust Sources*, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.

[3] USEPA AP-42 Section 13.2.2, *Unpaved Roads* (11/06).

[4] Data provided via email to Aubrey Jones (Ramboll) by Matthew Porter (NC DAQ) on July 27, 2017.

Pollutants for Source Classification Code (SCC) 3-07-008-01 (Log Debarking).[5] All PM was assumed to be larger than 2.5 microns in diameter. PM emissions from debarking are minimal due to the high moisture content of green wood (~50%) and the fact that bark is removed in pieces larger than that which can become airborne. A 90% control efficiency was applied for use of water spray in the debarker. The Bark Hog is also largely enclosed, and a 90% control efficiency was applied for partial enclosure. VOC and methanol emissions were quantified based on emission factors for log chipping from AP-42 Section 10.6.3, *Medium Density Fiberboard*.[6] Detailed potential emission calculations for the debarker and bark hog are included in Appendix C.

The Debarker (IES-DEBARK) and Bark Hog (IES-BARK) are considered insignificant activities per 15A NCAC 02Q .0503 due to potential uncontrolled PM and VOC emissions less than 5 tpy and potential HAP emissions less than 1,000 pounds per year (lb/yr).

3.4 Chipper (IES-EPWC)

The chipping process results in emissions of VOC and HAP. VOC and HAP emissions were quantified based on emission factors for log chipping from AP-42 Section 10.6.3, *Medium Density Fiberboard* and AP-42 Section 10.6.4, *Hardboard and Fiberboard*. Detailed emission calculations are included in Appendix C.

The chipper is considered an insignificant activity per 15A NCAC 02Q .0503 due to potential uncontrolled HAP and VOC emissions less than 1,000 lb/yr and 5 tpy, respectively.

3.5 Green Wood Fuel Storage Bins (IES-GWFB)

Bark and chips are transferred from the fuel storage piles via a walking floor to a covered conveyor and then to the fully enclosed Green Wood Fuel Storage Bins (IES-GWFB). Due to complete enclosure of the Green Wood Fuel Storage Bins (IES-GWFB), emissions from transfer of material into the bin were not specifically quantified.

3.6 Dryers (ES-DRYER-1 and ES-DRYER-2), Green Hammermills (ES-GHM-1 through ES-GHM-5), Dry Hammermills (ES-HM-1 through 8), and Dry Shavings Hammermills (ES-DSHM-1 and ES-DSHM-2)

Exhaust from the dryers will be routed to two dedicated WESP/RTO control systems (one for each dryer line) for control of PM, VOC, and HAP. The Green Hammermills will share the existing dryer's WESP/RTO control system for control of PM, VOC, and HAP. The Green Hammermills will have the ability to be routed and controlled by the Dryer #2 WESP and RTO (when constructed) when the Dryer #1 WESP and RTO are shut down. It should be noted that for potential-to-emit emission estimates, Green Hammermill emissions are accounted for under the Dryer #1 WESP and RTO.

Emissions of particulate matter are based on process knowledge and engineering judgement. Carbon monoxide (CO) emissions generated during green wood combustion are based on information from the NCASI database, process knowledge, and an appropriate contingency

[5] USEPA. Office of Air Quality Planning and Standards. *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants.* EPA 450/4-90-003. March 1990.

[6] USEPA AP-42 Section 10.6.3, *Medium Density Fiberboard Manufacturing* (08/02).

based on engineering judgement. Oxides of nitrogen (NO_X) emissions are based on process information and an appropriate contingency based on engineering judgement. Potential emissions of sulfur dioxide (SO_2) from green wood combustion were calculated based on the heat input of the furnace and an emission factor for wood combustion from AP-42, Section 1.6, *Wood Residue Combustion in Boilers*. VOC emissions were calculated using an emission factor derived from process information and an appropriate contingency based on engineering judgement. HAP and toxics air pollutant (TAP) emissions from green wood combustion were calculated based on emission factors from several data sources including engineering judgement/process knowledge, and emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*[7].

The Dry Hammermill and Dry Shavings Hammermills generate PM, PM_{10}, $PM_{2.5,}$ VOC, and HAP emissions during sizing of dried wood. PM emissions from the eight (8) Dry Hammermills and two (2) Dry Shavings Hammermills are routed to baghouses for control of PM emissions (CD-HM-BH-1 through 3). Particulate emissions from each baghouse were calculated using an exit grain loading rate, the maximum nominal exhaust flow rate of the baghouse, and the expected control efficiency of the WESP (CD-WESP-1). Note that the $PM_{2.5}$ speciation reflects a recent review of National Council for Air and Stream Improvement, Inc. (NCASI) particle size distribution data for similar baghouses used in the wood products industry.

The Dry Hammermill and Dry Shavings Hammermill exhaust through baghouses (CD-HM-BF-1 through 3 for Dry Hammermills and CD-HM-BF-3 for Dry Shavings Hammermills) and will be routed to a quench duct for fire safety and then to either the Dryer #1 (ES-DRYER-1) furnace, the Dryer #1 WESP (CD-WESP-1), or a combination of the two, and then to the Dryer #1 RTO (CD-RTO-1) for HAP and VOC control. Note, the quench duct is being installed for safety purposes only to reduce the risk of fire and is not considered a control device.

Uncontrolled VOC and HAP emissions at the outlet of the Dry Hammermill baghouses (CD-HM-BF-1 through 3) were quantified based on process knowledge and an appropriate contingency based on engineering judgement. Controlled emissions were estimated based on the expected destruction efficiency for the RTO. NO_x and CO emissions resulting from thermal oxidation were calculated using AP-42 Section 1.4, *Natural Gas Combustion*[8], and the maximum high heating value of the anticipated VOC constituents.

Emissions from natural gas and propane combustion by the RTO were calculated based on AP-42 Section 1.4, *Natural Gas Combustion*, AP-42 Section 1.5*, Liquefied Petroleum Gas Combustion,* NC DAQ's Wood Waste Combustion Spreadsheet[9], and emission factors from the South Coast Air Quality Management District's (SCAQMD) Air Emissions Reporting (AER) Tool. Detailed emission calculations are included in Appendix C.

3.6.1 Furnace Bypass (Cold Start-up)

Potential emissions of CO, NO_x, SO_2, PM, VOC and HAP for furnace bypass conditions were calculated based on emission factors from AP-42 Section 1.6, *Wood Residue Combustion in*

[7] USEPA AP-42 Section 1.6, *Wood Residue Combustion in Boilers* (09/03).

[8] USEPA AP-42 Section 1.4, *Natural Gas Combustion* (07/98).

[9] NCDAQ Wood Waste Combustion Spreadsheet for a wood stoker boiler. Available online at: https://files.nc.gov/ncdeq/Air%20Quality/permits/files/WWC_rev_K_20170308.xlsx.

Boilers.[10] Emissions were based on 15% of the maximum heat input capacity of the furnaces and 50 hours per year per furnace. Diesel fuel may be used as an accelerant for cold start-ups; however, as the amount used per event is typically 15 – 30 gallons and the annual usage is typically 100 – 200 gallons, emissions resulting from the use of diesel fuel are insignificant and are not included in the ES-FURNACEBYP-1 and ES-FURNACEBYP-2 emission estimates. Detailed potential emissions calculations are included in Appendix C.

3.6.2 Furnace Bypass (Idle Mode)

Each furnace may operate up to 500 hours per year in "idle mode", which is defined as operation up to a maximum heat input rate of 10 MMBtu/hr. During this time, emissions will exhaust out of the furnace bypass stacks. Potential emissions of CO, NO_X, SO_2, PM, VOC, and HAP were calculated based on emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*. Detailed potential emission calculations are included in Appendix C.

3.6.3 Double Duct Burners (IES-DDB-1 through IES-DDB-4) and Propane Vaporizer (IES-PVAP)

Emissions from natural gas and propane combustion by the double duct burners (IES-DDB-1 through IES-DDB-4) and propane vaporizer (IES-PVAP) were calculated based on AP-42 Section 1.4, *Natural Gas Combustion*, AP-42 Section 1.5*, Liquefied Petroleum Gas Combustion,* NC DAQ's Natural Gas Combustion Spreadsheet, and emission factors from the South Coast Air Quality Management District's (SCAQMD) Air Emissions Reporting (AER) Tool. Detailed emission calculations are included in Appendix C.

Per 15A NCAC 02Q .0503, the double duct burners (IES-DDB-1 through IES-DDB-4) and propane vaporizer (IES-PVAP) are considered insignificant activities because potential uncontrolled criteria pollutant and HAP emissions are less than 5 tpy and 1,000 lb/yr, respectively.

3.7 Dried Wood Handling (ES-DWH)

As previously described in Section 2, Dried Wood Handling (ES-DWH-1 and ES-DWH-2) will include partially enclosed conveyor systems and conveyor transfer points located after each dryer. Particulate matter emissions from transfers associated with ES-DWH-1 were calculated based on AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles*.[11] Although particulate emissions are controlled by the existing passive bin vent, no control efficiency was applied for the bin vent. Emissions from transfers associated with ES-DWH-2 will be routed through a baghouse (CD-DWH-BF-2). Particulate emissions from the baghouse (CD-DWH-BF-2) were calculated based on the exhaust flow rate and exit grain loading. Potential VOC and HAP emissions from Dried Wood Handling (ES-DWH-1 and ES-DWH-2) were calculated based on emission factors derived from NCASI's Wood Products Database (February 2013) for dry wood handling operations at an oriented strand board (OSB) mill and process knowledge and an appropriate contingency based on engineering judgement. Detailed potential emission calculations are provided in Appendix C.

[10] USEPA AP-42 Section 1.6, *Wood Residue Combustion in Boilers* (09/03).

[11] USEPA AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles* (11/06).

3.8 Dry Shavings Handling (IES-DRYSHAVE), Dry Line Feed Conveyor (ES-DLC-1) and Dry Line Hopper (IES-DLH)

Particulate emissions occur during transfer of dry shavings to the dry shavings pile (IES-DRYSHAVE), the Dry Line Hopper (IES-DLH), and Dry Line Feed Conveyor (ES-DLC-1). Potential emissions from material transfer were calculated based on Equation 1 of AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*.[10] Per 15A NCAC 02Q .0503, the Dry Line Hopper is an insignificant activity due to uncontrolled emissions below 5 tpy.

Particulate emission factors used to quantify emissions from storage pile wind erosion for the Dry Shavings Storage Pile (IES-DRYSHAVE) were calculated based on USEPA's *Control of Open Fugitive Dust Sources*.[12] The number of days with rainfall greater than 0.01 inch was obtained from AP-42 Section 13.2.2, *Unpaved Roads*[13], and the percentage of time that wind speed exceeds 12 mph was determined based on the AERMOD-ready meteorological dataset for the Maxton NWS Station provided by DAQ[14]. The mean silt content of 8.4% for unpaved roads at lumber mills from AP-42 Section 13.2.2 was conservatively applied in the absence of site-specific data. The exposed surface area of the pile was calculated based on worst-case pile dimensions.

VOC emissions from the storage pile were quantified based on the exposed surface area of the pile and emission factors from the National Council for Air and Stream Improvement (NCASI). NCASI emission factors range from 1.6 to 3.6 pounds (lb) VOC as carbon/acre-day; however, emissions were conservatively based on the maximum emission factor. Detailed potential emissions calculations can be found in Appendix C.

3.9 Dry Shavings Reception, Handling, and Silo (ES-DSR, IES-DRYSHAVE, and ES-DSS)

Particulate emissions will occur during unloading of dry shavings from the existing and new dry shavings truck dumps (IES-DRYSHAVE). Potential emissions from dry shavings storage piles and dry shavings transfer activities associated with IES-DRYSHAVE were calculated based on AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*.[15]

Particulate emissions from Dry Shavings Reception (ES-DSR) will be controlled by the Dry Shavings Reception baghouse. Particulate emissions from the baghouse were calculated based on the exhaust flow rate and exit grain loading. Dry shavings will be transferred into the new Dry Shavings Silo (ES-DSS) via an enclosed conveyor and bucket elevator. Particulate emissions from the Dry Shavings Silo (CD-DSS-BF) were calculated based on the baghouse exhaust flow rate and exit grain loading. Detailed potential emission calculations are provided in Appendix C.

3.10 Pellet Cooler HP Fines Relay System (ES-PCHP)

Fine pellet material is conveyed from finished product handling to the Pellet Cooler High Pressure Fines Relay System, controlled by a baghouse (CD-PCHP-BV). PM emissions from

[12] USEPA *Control of Open Fugitive Dust Sources*, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.

[13] USEPA AP-42 Section 13.2.2, *Unpaved Roads* (11/06).

[14] Data provided via email to Aubrey Jones (Ramboll) by Matthew Porter (NC DAQ) on July 27, 2017.

[15] USEPA AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles* (11/06).

this baghouse were calculated based on an exit grain loading rate and the maximum nominal exhaust flow rate of the baghouse. Potential emission calculations are provided in Appendix C.

3.11 Pellet Mill Feed Silo (ES-PMFS)

The Pellet Mill Feed Silo is equipped with a bin vent filter (CD-PMFS-BV) to control PM emissions associated with silo loading and unloading operations. PM emissions are calculated based on an exit grain loading rate and the maximum nominal exhaust flow rate of the baghouse. Potential emission calculations are provided in Appendix C.

3.12 Additive Handling and Storage (IES-ADD)

An additive may be used in the pellet production process to increase the durability of the final product. Potential emissions from transfer activities associated with Additive Handling (IES-ADD) were calculated based on AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*.[16] Detailed potential emissions calculations are provided in Appendix C.

Per 15A NCAC 02Q .0503, Additive Handling and Storage (IES-ADD) is considered an insignificant activity because potential uncontrolled PM emissions are less than 5 tpy.

3.13 Pellet Press System and Pellet Coolers (ES-CLR-1 through ES-CLR-6)

Pellet Press System (Pellet Mills) and Pellet Cooler (ES-CLR-1 through 6) operations will generate PM, HAP, and VOC emissions during the forming and cooling of wood pellets. The Pellet Mills and Coolers are equipped with six (6) simple cyclones (CD-CLR-1 through CD-CLR-6) and will be routed to a quench duct and then through the RTO/RCO (CD-RCO-2) for VOC and HAP control. Note, the quench duct being installed is for safety purposes only to reduce the risk of fire in the RTO/RCO and is not considered a control device. PM emissions from the Pellet Press System (Pellet Mills) and Pellet Coolers were calculated based on a maximum exit grain loading rate and the maximum nominal exhaust flow rate for the cyclones. Potential criteria pollutant emissions from natural gas and propane combustion by the RTO/RCO were calculated based on AP-42 Section 1.4, *Natural Gas Combustion*[17] and AP-42 Section 1.5*, Liquefied Petroleum Gas Combustion.*[18] NO_x and CO emissions resulting from thermal oxidation were calculated using emission factors from AP-42 Section 1.4, *Natural Gas Combustion* and the maximum high heating value of the anticipated VOC constituents.[19]

Uncontrolled VOC and HAP emissions at the outlet of the Pellet Cooler were quantified based on process information and an appropriate contingency based on engineering judgement. This includes emissions from both the Pellet Mills and the Pellet Coolers. Controlled emissions were conservatively based on a 95% control efficiency for the RTO/RCO. The RTO and RCO modes have the same control efficiency so there is no impact on emissions when switching between operating modes. Emissions of HAP from natural gas/propane combustion by the RTO/RCO

[16] USEPA AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles* (11/06).

[4] USEPA AP-42 Section 1.4, *Natural Gas Combustion* (07/98).

[18] USEPA AP-42 Section 1.5*, Liquefied Petroleum Gas Combustion* (07/08).

[19] USEPA AP-42 Section 1.4, *Natural Gas Combustion* (07/98).

burners were estimated using emission factors from AP-42 Section 1.4 and the SCAQMD's AER Tool.[20] Detailed calculations are provided in Appendix C.

3.14 Pellet Loadout Bins (ES-PB-1 through ES-PB-12), Pellet Mill Loadout (ES-PL-1 and ES-PL-2), and Finished Product Handling (ES-FPH)

Particulate emissions result from the transfer of finished product to the Pellet Loadout Bins. PM emissions from transfers associated with Finished Product Handling, Pellet Mill Loadout, and the Pellet Loadout Bins are controlled by a baghouse (CD-FPH-BF). Potential PM emissions from the baghouse were calculated based on a maximum exit grain loading rate and the maximum nominal exhaust flow rate of the baghouse. Detailed potential emissions calculations are provided in Appendix C.

3.15 Emergency Generator (IES-GN-1 and ES-GN-2) and Fire Water Pump Engine (IES-FWP)

Operation of the Emergency Generator and Fire Water Pump generates emissions of criteria pollutants and HAP. Potential PM, NO_X, and CO emissions from operation of the existing Emergency Generator (IES-GN-1) and Fire Water Pump Engine were calculated based on emission standards from NSPS Subpart IIII (or 40 CFR 89 where applicable) and the maximum horsepower rating of the engines, while emissions of PM, NO_X, VOC, and CO from the new Emergency Generator (IES-GN-2) were calculated based on emission factors from the manufacturer specification sheet. Potential SO_2 emissions from all three engines were calculated based on the fuel sulfur restriction in NSPS Subpart IIII, and by assuming that all the sulfur present in the diesel fuel becomes SO_2 air emissions.[21] Potential VOC emissions from the existing Emergency Generator and Fire Water Pump and HAP emissions from all three engines were quantified based on emission factors from AP-42 Section 3.3, *Stationary Internal Combustion Engines*.[22] Annual potential emissions were conservatively calculated based on 500 hours per year.

The Emergency Generators and Fire Water Pump Engine are considered insignificant activities pursuant to 15A NCAC 02Q .0503 because potential uncontrolled criteria pollutant and HAP emissions are less than 5 tpy and 1,000 lb/yr, respectively. Refer to Appendix C for detailed potential emission calculations.

3.16 Diesel Storage Tanks (IES-TK-1 through IES-TK-4)

The storage of diesel in on-site storage tanks generates emissions of VOC. VOC emissions from the four (4) Diesel Storage Tanks were calculated using equations and methodologies from AP-42, Chapter 7 (November 2019) based on actual tank characteristics (e.g., orientation, dimensions, etc.) and potential annual throughput. VOC emissions from the storage tanks are below 5 tpy and thus, per 15A NCAC 02Q .0503 they are listed as

[20] South Coast Air Quality Management District's (SCAQMD) Air Emissions Reporting (AER) Tool. Available online at: http://www3.aqmd.gov/webappl/help/newaer/index.html

[21] Sulfur content in accordance with Year 2010 standards of 40 CFR 80.510(b) as required by NSPS Subpart IIII.

[22] USEPA AP-42 Section 3.3, *Stationary Internal Combustion Engines* (10/96).

insignificant sources in the permit. Refer to Appendix C for detailed potential emission calculations.

3.17 Haul Roads

Fugitive PM emissions occur as a result of trucks and employee vehicles traveling on paved and unpaved roads on the Northampton plant property. Emission factors for paved roads were calculated based on Equation 2 from AP-42 Section 13.2.1, *Paved Roads*[23] using the mean silt loading for quarries (8.2 g/m^2) and 120 days with rainfall greater than 0.01 inch based on Figure 13.2.1-2. Emission factors for unpaved roads were calculated based on Equation 1a from AP-42 Section 13.2.2, *Unpaved Roads*[24] using a surface material silt content (8.4%) and 120 days with rainfall greater than 0.01 inch based on Figure 13.2.1-2. A 90% control efficiency was applied for water/dust suppression activities. This control efficiency is based on data from the *Air Pollution Engineering Manual* of the Air and Waste Management Association. Refer to Appendix C for detailed potential emissions calculations.

[23] USEPA AP-42 Section 13.2.1, *Paved Roads* (01/11).

[24] USEPA AP-42 Section 13.2.2, *Unpaved Roads* (01/11).

4. STATE AND FEDERAL PERMITTING APPLICABILITY

The Enviva Northampton plant is subject to federal and state air quality permitting requirements. The following sections summarize potentially applicable federal and state permitting programs.

4.1 Federal Permitting Programs

The federal New Source Review (NSR) permitting program includes requirements for construction of new sources and modifications to existing sources, while the Title V Operating Permit Program includes requirements for operation of facilities considered major sources. The following sections discuss applicability of these federal permitting programs to the Northampton plant.

4.1.1 New Source Review

NSR is a federal pre-construction permitting program that applies to certain major stationary sources. The primary purpose of NSR is to support the attainment and maintenance of ambient air quality standards across the country. The NSR permitting program is comprised of two separate permitting programs that apply, depending on whether the facility is located in an area designated as attainment or nonattainment with respect to the National Ambient Air Quality Standards (NAAQS). The federal NSR permitting program is implemented in North Carolina through 15A NCAC 2D .0530 (PSD) and 15A NCAC 2D .0531 (Nonattainment New Source Review (NNSR)). Because NNSR and PSD requirements are pollutant-specific, a stationary source can be subject to NNSR requirements for one or more regulated NSR pollutants and to PSD requirements for the remaining regulated NSR pollutants.

NNSR permitting requirements apply to stationary sources located in an area where concentrations of a "criteria pollutant"[25] exceed the National Ambient Air Quality Standard (NAAQS) for that pollutant. PSD permitting requirements apply to major stationary sources for each criteria pollutant for which the geographic area in which the source is located has been designated as unclassifiable or in attainment with respect to relevant NAAQS. PSD permitting requirements also apply to certain stationary sources regardless of location for each regulated NSR pollutant that is not a criteria pollutant (e.g., fluorides, hydrogen sulfide, and sulfuric acid mist).

The Northampton plant is located in Northampton County, which is currently classified as attainment or unclassifiable for all pollutants.[26] The Northampton plant will be a minor source with respect to the PSD permitting program following installation of controls, as authorized by Permit R07, because facility-wide potential emissions of the regulated pollutants will be less than the major source threshold of 250 tpy. This application does not impact the plant's NSR status.

[25] The following are "criteria pollutants" under current NSR regulations: CO, nitrogen dioxide, SO_2, PM_{10}, $PM_{2.5}$, ozone (VOCs and NO_X), and lead.

[26] https://www3.epa.gov/airquality/greenbook/anayo_nc.html

4.1.2 Title V Operating Permit Program

The federal Title V Operating Permit program is set forth in 40 Code of Federal Regulations (CFR) Part 70 and is implemented in North Carolina via 15A NCAC 2Q.0500. The Northampton plant is a major source with respect to the Title V Operating Permit Program because facility-wide potential emissions of one or more criteria pollutants exceed the major source threshold of 100 tpy. This Title V permit application is being submitted within 30 days of issuance of Permit R07 as required by Condition 2.2.A.11 of the permit and incorporates all changes authorized in Permit R07 for the Northampton plant. This application replaces all previously submitted Title V applications for the Northampton plant.

4.2 North Carolina Permitting Program

15A NCAC 02Q.0300 and 02Q.500 include specific requirements for permitting of construction and operation of new and modified sources in accordance with North Carolina's State Implementation Plan (SIP). Enviva is subject to the Title V procedures under 15A NCAC 02Q.0500 and is thus submitting this initial Title V Air Permit Application update to NC DAQ. The required application forms are included as Appendix D.

5. REGULATORY APPLICABILITY

The Northampton plant is subject to federal and state air quality regulations. The following addresses all potentially applicable regulations. A detailed summary of applicable requirements by emission source is included in Appendix D following Form E3.

5.1 New Source Performance Standards

New Source Performance Standards (NSPS) apply to new and modified sources and require sources to control emissions in accordance with standards set forth at 40 CFR Part 60. NSPS standards in 40 CFR Part 60 have been incorporated by reference in 15A NCAC 02D.0524.

5.1.1 40 CFR 60 Subpart A – General Provisions

All sources subject to a NSPS are subject to the general requirements under Subpart A unless excluded by the source-specific subpart. Subpart A includes requirements for initial notification, performance testing, recordkeeping, monitoring, and reporting. Subpart A is applicable because the emergency generators and fire water pump are subject to NSPS Subpart IIII.

5.1.2 40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

NSPS Subpart Dc applies to owners or operators of steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input of 100 MMBtu/hr or less but greater than or equal to 10 MMBtu/hr. There are no steam generating units as defined by NSPS Subpart Dc at the facility; therefore, NSPS Subpart Dc does not apply.

5.1.3 40 CFR 60 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels

NSPS Subpart Kb applies to volatile organic liquid (VOL) storage tanks that were constructed after July 23, 1984, have a maximum storage capacity greater than or equal to 75 m3 (19,813 gal), and meet the following criteria:[27]

- The storage tank has a storage capacity greater than or equal to 75 m^3 (19,813 gal) but less than 151 m^3 (39,890 gal), and stores a VOL with a maximum true vapor pressure greater than or equal to 15.0 kPa (2.2 psia); or
- The storage tank has a storage capacity greater than or equal to 39,890 gal and stores a VOL with a maximum true vapor pressure greater than or equal to 3.5 kPa (0.51 psia).

[27] 40 CFR 60.110b(a)-(b)

The diesel storage tanks at the Northampton plant are not subject to NSPS Subpart Kb, as the storage capacity of each tank is less than 19,813 gal, and diesel has a maximum true vapor pressure less than 2.2 psia.

5.1.4 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

NSPS Subpart IIII applies to owners or operators of compression ignition (CI) internal combustion engines (ICE) manufactured after April 1, 2006 that are not fire pump engines, and fire pump engines manufactured after July 1, 2006. The 350 bhp Emergency Generator 1 (IES-GN-1), 671 bhp Emergency Generator 2 (IES-GN-2), and 300 bhp Fire Water Pump Engine (IES-FWP) at the Northampton plant are subject to NSPS Subpart IIII.

The Emergency Generators must meet the emission standards for new nonroad CI engines in Table 1 of §89.112 for engines with a displacement less than 30 liters per cylinder and a maximum power rating greater than 37 kW as required by §60.4205(b) and §60.4202(a)(2). The Fire Water Pump must comply with the emission standards in Table 4 of Subpart IIII for engines with a maximum power rating between 300 and 600 hp as required by §60.4205(c). Applicable emission standards are summarized in Table 5-1 below.

Table 5-1. NSPS Subpart IIII Emission Standards

Engine	NMHC + NO_X (g/kW-hr)	CO (g/kW-hr)	PM (g/kW-hr)
IES-GN-1 IES-GN-2 IES-FWP	4.0	3.5	0.20

The Emergency Generators and Fire Water Pump will be operated for no more than 100 hours per year for the purposes of maintenance and readiness checks [§60.4211(f)(2)]. All three engines will be certified to meet the referenced emission limits in accordance with §60.4211(c). Enviva will operate and maintain the engines in accordance with the manufacturer's emission-related written instructions and will not change any emissions-related settings other than those that are permitted by the manufacturer [§60.4211(a)(1) and (2)]. The emergency generator engines are required to be equipped with a non-resettable hour meter in accordance with §60.4209(a).

For all three engines, Enviva will comply with the fuel requirements in §80.510(c), as required by §60.4207(b), which limits the fuel sulfur content to a maximum of 15 parts per million by weight (ppmw) and either a cetane index of at least 40 or a maximum aromatic content of 35 percent by volume.

5.2 National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP) regulate HAP emissions and are applicable to certain major and area sources of HAP. NESHAP can be found in 40 CFR Part 63 and have been incorporated by reference in 15A NCAC 02D.1111. The Northampton plant will be a minor source of HAP emissions following implementation of the changes authorized by Permit R07 as facility-wide total HAP emissions will not exceed 25 tpy and maximum individual HAP emissions will not exceed 10 tpy.

5.2.1 40 CFR 63 Subpart A – General Provisions

All sources subject to a NESHAP are subject to general requirements under Subpart A unless excluded by the source-specific subpart. Subpart A includes requirements for initial notification, performance testing, recordkeeping, monitoring, and reporting. Since the emergency generators and fire pump are subject to Subpart ZZZZ, Subpart A is also applicable to these sources.

5.2.2 40 CFR 63 Subpart B – Requirements for Control Technology Determinations for Major Sources in Accordance with Clean Air Act Sections 112(g) and 112(j)

Clean Air Act (CAA) Section 112(g)(2)(B) requires that a new or reconstructed stationary source that does not belong to a regulated "source category" for which a NESHAP has been promulgated must control emissions to levels that reflect "maximum achievable control technology" (MACT). As provided in §63.40(b), a case-by-case MACT evaluation is only required prior to the construction or reconstruction of a major source of HAP emissions. The Northampton plant is not a newly constructed or reconstructed source and will not be subject to 112(g) since it will be a minor source of HAPs.

5.2.3 40 CFR 63 Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines

Subpart ZZZZ applies to reciprocating internal combustion engines (RICE) located at a major or area source of HAP emissions. Emergency stationary RICE are defined in §63.6675 as any stationary RICE that operates in an emergency situation. These situations include engines used for power generation when a normal power source is interrupted, or engines used to pump water in the case of fire or flood. The Northampton plant's two (2) Emergency Generators and emergency Fire Water Pump are classified as emergency RICE under Subpart ZZZZ. Further, the engines are classified as new sources, as they have been or will be constructed after June 12, 2006.

New or reconstructed stationary RICE located at an area source of HAP are only subject to the requirement to comply with the applicable provisions of NSPS Subpart IIII, per §63.6590(c)(1), and no further requirements apply under Subpart ZZZZ.

5.2.4 40 CFR 63 Subpart JJJJJJ – NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources

Subpart JJJJJJ, also referred to as the Area Source Boiler NESHAP, provides emission standards for boilers located at area sources of HAP emissions. The Northampton plant does not include any boilers; therefore, Subpart JJJJJJ does not apply.

5.3 Compliance Assurance Monitoring

Compliance Assurance Monitoring (CAM) under 40 CFR 64 is applicable to emission units located at a Title V major source that use a control device to achieve compliance with an emission limit and whose pre-controlled emissions exceed the major source thresholds. A CAM plan is required to be submitted with the Initial Title V operating permit application for emission units whose post-controlled emissions exceed the major source thresholds (i.e., large

pollutant-specific emission units [PSEU]).[28] For emission units with post-controlled emissions below the major source thresholds, a CAM plan must be submitted with the first Title V permit renewal application.[29]

CAM will potentially be applicable to sources at the Northampton plant; however, no emission units have post-controlled emissions above major source thresholds. As such, any CAM plans that may be required are not due until submittal of the initial Title V renewal. Applicability of 40 CFR 64 requirements will be fully assessed at that time.

All other emission units at the Northampton plant have pre-controlled emissions below the major source threshold and/or do not use a control device as defined in §64.1. Thus, CAM is not applicable to any other sources.

5.4 Chemical Accident Prevention Provisions

The Chemical Accident Prevention Provisions, promulgated in 40 CFR Part 68, provide requirements for the development of risk management plans (RMP) for regulated substances. Applicability of RMP requirements is based on the types and amounts of chemicals stored at a facility. Propane, which is a regulated substance under Subpart F of this rule, will be stored at the Northampton facility to be used as a fuel for the RTO burners, RTO/RCO burners, propane vaporizer, and dryer system double duct burners. Per §68.126, however, substances used as a fuel or held for sale as a fuel at a retail facility are excluded from all provisions; therefore, an RMP is not required for the Northampton facility.

5.5 North Carolina Administrative Code

The Northampton plant sources are subject to regulations contained within 15A NCAC 02D and 02Q. Potentially applicable regulations are addressed below. Generally applicable regulations are not included (e.g., 15A NCAC 02Q .0207 and 02D .0535).

5.5.1 15A NCAC 02D .0503 Particulates from Fuel Burning Indirect Heat Exchangers

15A NCAC 02D .0503 limits PM emissions from indirect heat exchangers, excluding those that combust wood. An indirect heat exchanger is defined as equipment used for the alteration of the temperature of one fluid by the use of another fluid in which the two fluids are not mixed. Burners will be used to heat the dryer double ducts; however, these burners will provide direct heating of the ducts. The propane vaporizer will also be direct fired. As such, this regulation does not apply.

5.5.2 15A NCAC 02D .0504 Particulates from Wood Burning Indirect Heat Exchangers

15A NCAC 02D .0504 provides PM emission limits for indirect heat exchangers combusting wood. As previously described, an indirect heat exchanger is defined as equipment used for the alteration of the temperature of one fluid by the use of another fluid in which the two

[28] §64.5(a)

[29] §64.5(b)

fluids are not mixed. The Dryers will each be heated by a wood-fired furnace burner system; however, the furnace burner systems provide direct heating of the wood chips. As such, this regulation does not apply.

5.5.3 15A NCAC 02D .0515 Particulates from Miscellaneous Industrial Processes

PM emissions from all emission sources subject to permitting and for which no other emission control standards are applicable are regulated under 15A NCAC 02D .0515. This regulation limits particulate emissions based on process throughput using the equation $E = 4.10 \times P^{0.67}$, for process rates (P) less than 30 tons per hour (tph) and $E=55 \times P^{0.11}-40$ for process rates greater than or equal to 30 tph. All emissions from PM sources at the Northampton plant are either negligible or controlled by cyclones, baghouses, or a WESP, and thus, will comply with this requirement. The PM limits based on process weight for each emission point are summarized in Table 5-2 below.

Table 5-2. PM Limits Based on Process Weight for Northampton Emission Points

Emission Point ID	Source Description	Control Device	Process Weight Input Rate (tph)	Allowable Emission Rate (lb/hr)
ES-DRYER-1	One (1) 175.3 MMBtu/hr Wood-fired Direct	CD-WESP-1; CD-RTO-1	138	54.6
ES-DRYER-2	One (1) 180 MMBtu/hr Wood-fired Direct	CD-WESP-2; CD-RTO-2	158	56.0
ES-DWH-1	Dried Wood Handling 1	CD-DWH-BV	78	48.8
ES-DWH-2	Dried Wood Handling 2	CD-DWH-BF-2	89	50.1
ES-GWHS	Green Wood Handling and Storage	N/A	400	66.3
IES-DLH	Dry Line Hopper	N/A	10	19.2
ES-DLC-1	Dry Line Feed Conveyor	N/A	10	19.2
IES-DRYSHAVE	Dry Shavings Handling and Storage	N/A	58	46.0
ES-DSHM-1 and ES-DSHM-2	Dry Shavings Hammermills	CD-HM-BF-3; CD-WESP-1; CD-RTO-1;	30	40.1
IES-EPWC	Electric Powered Green Wood Chipper	N/A	357	65.0

Table 5-2. PM Limits Based on Process Weight for Northampton Emission Points				
Emission Point ID	**Source Description**	**Control Device**	**Process Weight Input Rate (tph)**	**Allowable Emission Rate (lb/hr)**
ES-GHM-1 through ES-GHM-5	Green Hammermills 1 through 5	CD-WESP-1; CD-RTO-1; CD-WESP-2; CD-RTO-2	300	63.0
IES-BARK	Bark Hog	N/A	63	46.8
IES-DEBARK	Debarker	N/A	420	66.9
ES-HM-1 through ES-HM-8	Dry Hammermills 1 through 8	CD-HM-CYC-1 through CD-HM-CYC-8; CD-HM-BF-1 through CD-HM-BF-3; CD-WESP-1; CD-RTO-1	173	57.0
IES-DSS	Dry Shaving Silo	CD-DSS-BF	36	41.6
ES-DSR	Dry Shavings Reception	CD-DSR-BF	36	41.6
ES-PS-1 and ES-PS-2	Dry Hammermill Pre-screeners 1 and 2	N/A	10	19.2
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BV	152	55.6
ES-CLR-1 through ES-CLR-6	Pellet Presses and Coolers 1 through 6	CD-CLR-1 through CD-CLR-6; CD-RCO-2	152	55.6
ES-PCHP	Pellet Cooler HP Fines Relay System	CD-PCHP-BV	10	19.0
IES-ADD	Additive Handling and Storage	N/A	1	4.1
ES-FPH; ES-PB-1 through ES-PB-12; ES-PL-1 and ES-PL-2	Finished Product Handling; Twelve pellet loadout bins; Pellet mill load-out 1 and 2	CD-FPH-BF	152	55.6

5.5.4 15A NCAC 02D .0516 Sulfur Dioxide Emissions from Combustion Sources

Emissions of SO_2 from combustion sources may not exceed 2.3 pounds of SO_2 per MMBtu input. The Emergency Generators (IES-GN-1 and IES-GN-2) and Fire Water Pump (IES-FWP) will use ultra-low sulfur diesel, the Dryer furnace burner systems will combust bark and wood chips, and the Dryer 1 RTO (CD-RTO-1), Dryer 2 RTO (CD-RTO-2), Pellet Mills and Pellet Coolers RTO/RCO (CD-RCO-2), Propane Vaporizer (IES-PVAP), and Double Duct Burners (IES-DDB-1 through IES-DDB-4) will utilize natural gas or propane, each of which contain low amounts of sulfur and will result in SO_2 emissions below the limit of 2.3 lb/MMBtu.

5.5.5 15A NCAC 02D .0519 Control of Nitrogen Dioxide and Nitrogen Oxide Emissions

15A NCAC 02D .0519 limits NO_X emissions from boilers. The Northampton plant does not include any boilers; therefore, this regulation is not applicable.

5.5.6 15A NCAC 02D .0521 Control of Visible Emissions

For sources manufactured after July 1, 1971, visible emissions cannot exceed 20 percent opacity when averaged over a six-minute period except under the following conditions:

- No six-minute period exceeds 87 percent opacity,
- No more than one six-minute period exceeds 20 percent opacity in any hour, and
- No more than four six-minute periods exceed 20 percent opacity in any 24-hour period.

This rule applies to all processes that may have visible emissions.

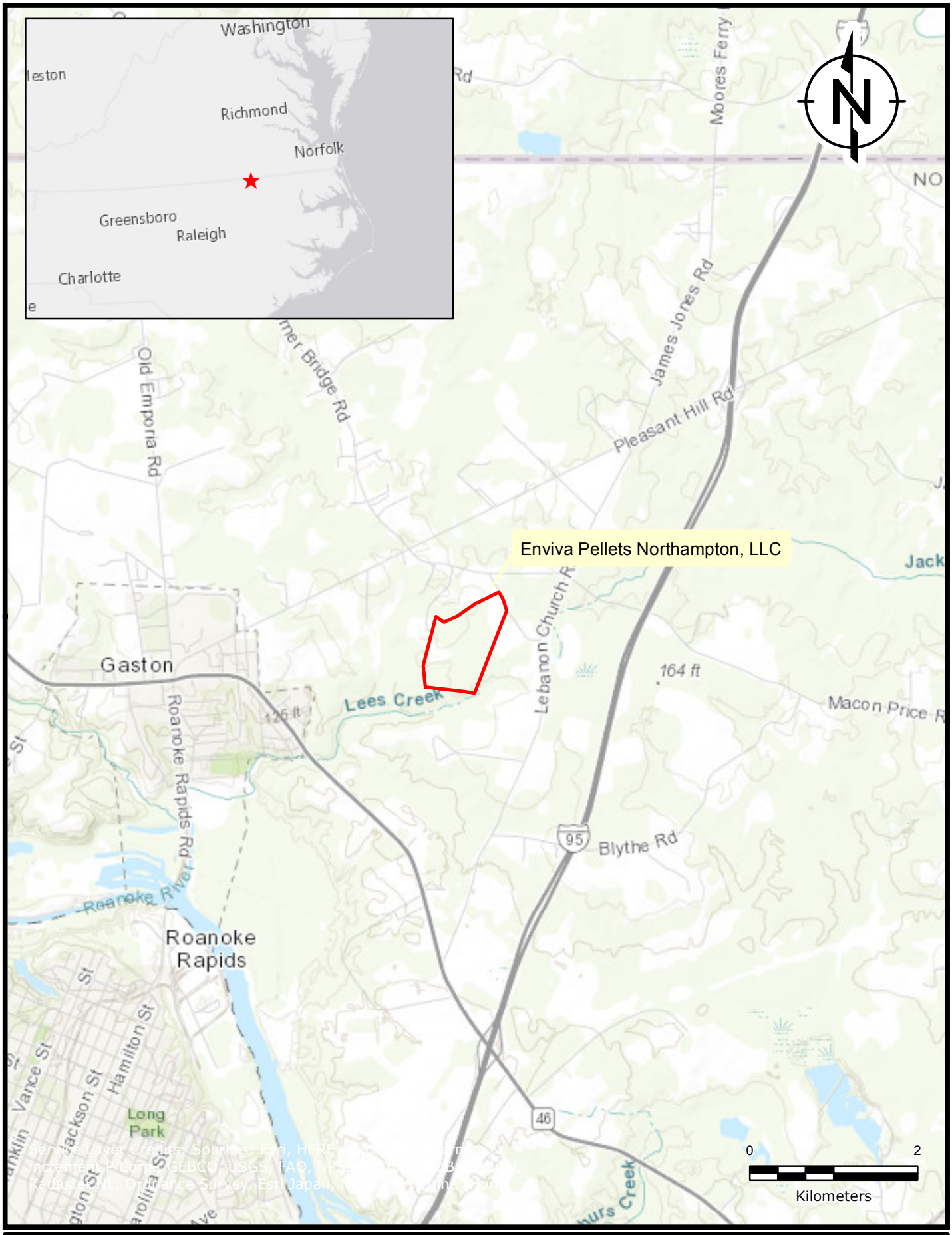
5.5.7 15A NCAC 02D .0540 Particulate from Fugitive Dust Emission Sources

15A NCAC 02D .0540 requires a fugitive dust control plan to be prepared if ambient monitoring or air dispersion modeling show a violation or the potential for a violation of the PM NAAQS, or if NC DAQ observes excess fugitive dust emissions from the facility beyond the property boundary for six (6) minutes in any one hour using EPA Method 22. Previous dispersion modeling for the Northampton plant does not show a violation or the potential for a violation of the PM_{10} or $PM_{2.5}$ NAAQS. A fugitive dust control plan has not been requested by DAQ for the Northampton plant.

5.5.8 15A NCAC 02D .1100 Control of Toxic Air Pollutant Emissions

A TAP permit application is required to include an evaluation of the TAP emissions from a facility's sources, excluding exempt sources listed under 15A NCAC 02Q .0702(a)(18). Enviva previously conducted TAP modeling in support of Permit R06. The changes that are reflected in Permit R07 are decreasing TAP emission rates previously modeled. Therefore, Enviva does not believe an updated TAP modeling analysis is required.

APPENDIX A
AREA MAP



RAMBOLL

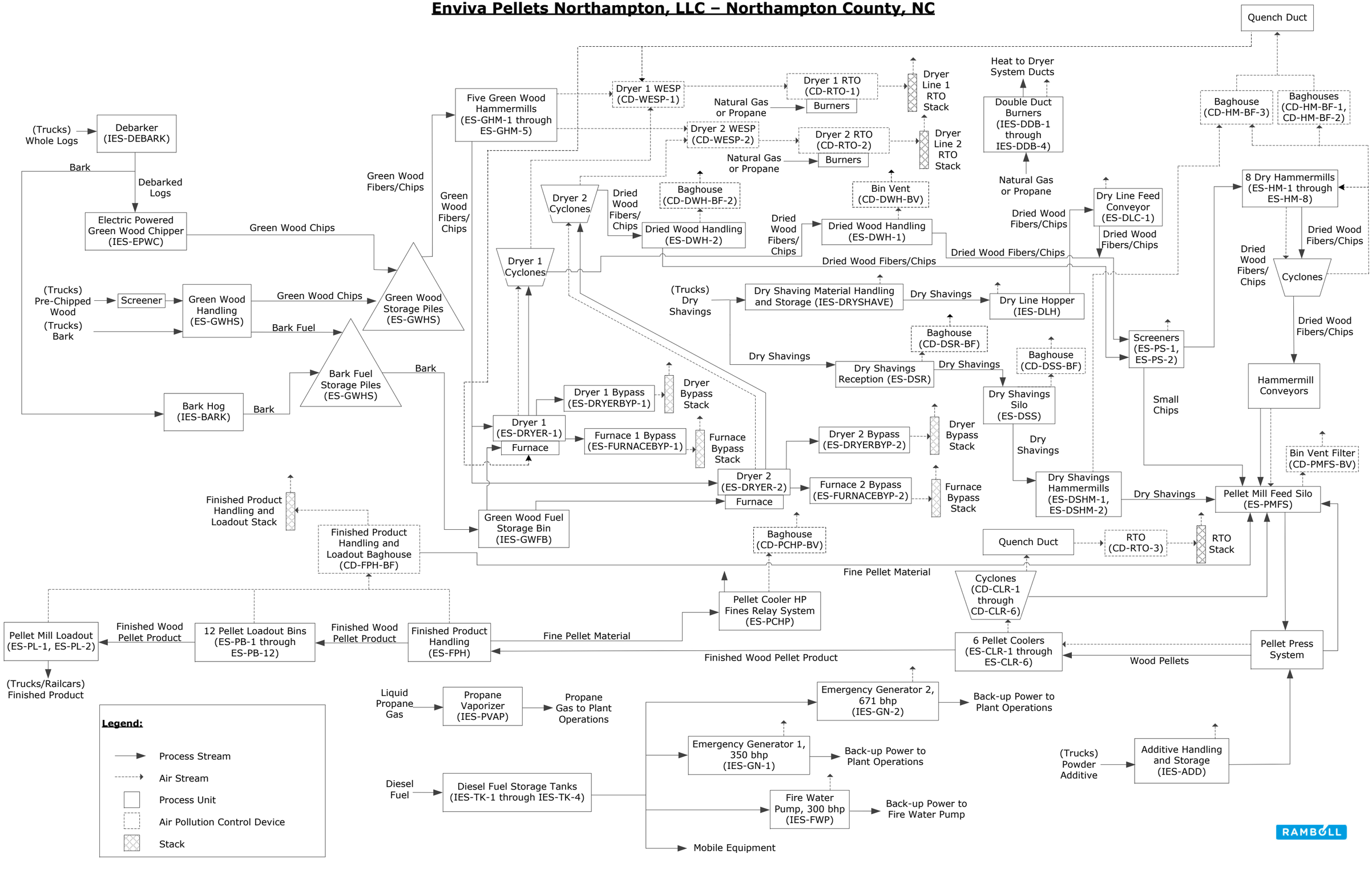
Site Location Map
Enviva Pellets Northampton, LLC
Garysburg, Northampton County, North Carolina

FIGURE
1

DRAFTED BY: ARJ | DATE: 9/11/2018 | PROJECT: 1690009489

APPENDIX B
PROCESS FLOW DIAGRAM

Appendix B - Process Flow Diagram
Enviva Pellets Northampton, LLC – Northampton County, NC



APPENDIX C
POTENTIAL EMISSIONS CALCULATIONS

Table 1
Facility-wide Criteria and CO_2e Emissions Summary
Enviva Pellets Northampton, LLC

Emission Unit ID	Source Description	Control Device ID	Control Device Description	CO (tpy)	NOx (tpy)	TSP (tpy)	PM-10 (tpy)	PM-2.5 (tpy)	SO2 (tpy)	Total VOC (tpy)	CO_{2e} (tpy)
ES-GHM-1 through ES-GHM-5	Green Hammermills 1 through 5	CD-WESP-1; CD-RTO-1	WESP; RTO	157.0	195.7	67.6	67.6	67.0	38.9	38.7	364,960
ES-DRYER-1[1]	Dryer #1										
ES-HM-1 through ES-HM-8	Dry Hammermills 1 through 8	CD-HM-CYC-1 through 8; CD-HM-BF-1 through 3; CD-WESP-1; CD-RTO-1	Cyclones; Baghouses; WESP; RTO								
ES-DSHM-1 and ES-DSHM-2	Dry Shavings Hammermills 1 and 2										
ES-DRYER-2[1]	Dryer #2	CD-WESP-2; CD-RTO-2	WESP; RTO								
ES-FURNACEBYP-1	Furnace #1 Bypass	--	--	1.89	0.69	1.82	1.63	1.41	0.079	0.054	662
IES-DDB-1 and -2	Dryer #1 Double Duct Burners	--	--	1.80	1.56	0.17	0.17	0.17	0.013	0.24	3,048
ES-FURNACEBYP-2	Furnace #2 Bypass	--	--	1.91	0.70	1.83	1.64	1.42	0.079	0.054	665
IES-DDB-3 and -4	Dryer #2 Double Duct Burners	--	--	1.80	1.56	0.17	0.17	0.17	0.013	0.24	3,048
IES-PVAP	Propane Vaporizer	--	--	0.36	0.62	0.034	0.034	0.034	0.0026	0.048	610
ES-CLR-1 through ES-CLR-6	Pellet Coolers 1 through 6	CD-CLR-1 through CD-CLR-6; CD-RCO-2	Simple Cyclones; RCO/RTO	5.31	8.72	38.9	10.5	1.65	0.032	28.2	9,852
ES-DWH-1[4]	Dried Wood Handling 1	CD-DWH-BV	Passive Bin Vent	--	--	0.53	0.45	0.39	--	48.5	--
ES-DWH-2[4]	Dried Wood Handling 2	CD-DWH-BF-2	Baghouse								
ES-PS-1 and -2	Dry Hammermill Prescreeners 1 and 2	--	--	--	--	0.24	0.11	0.017	--	--	--
ES-PCHP	Pellet Cooler HP Fines Relay System	CD-PCHP-BV	Baghouse	--	--	0.54	0.54	0.54	--	--	--
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BV	Baghouse	--	--	0.38	0.38	0.38	--	--	--
ES-FPH; ES-PB-1 through ES-PB-12; ES-PL-1 and ES-PL-2	Finished Product Handling; Twelve Pellet Loadout Bins; Pellet Mill Loadout 1 and 2	CD-FPH-BF	Baghouse	--	--	5.33	4.85	2.13	--	--	--
IES-ADD	Additive Handling and Storage	--	--	--	--	0.26	0.12	0.018	--	--	--
IES-DLH	Dry Line Hopper	--	--	--	--	0.01	0.003	0.001	--	--	--
ES-DLC-1	Dry Line Feed Conveyor	--	--	--	--	0.01	0.003	0.001	--	--	--
IES-DRYSHAVE	Dry Shaving Material Handling and Storage	--	--	--	--	0.44	0.22	0.033	--	0.19	--
ES-DSS	Dry Shavings Silo	CD-DSS-BF	Baghouse	--	--	0.08	0.08	0.08	--	--	--
ES-DSR	Dry Shavings Reception	CD-DSR-BF	Baghouse	--	--	0.38	0.38	0.38	--	--	--
ES-GWHS	Green Wood Handling and Storage	--	--	--	--	16.3	8.17	1.23	--	8.30	--
IES-EPWC	Electric Powered Green Wood Chipper	--	--	--	--	--	--	--	--	1.95	--
IES-BARK	Bark Hog	--	--	--	--	0.47	0.26	--	--	0.59	--
IES-DEBARK	Debarker	--	--	--	--	1.56	0.86	--	--	--	--
IES-GWFB[2]	Green Wood Fuel Bin	--	--	--	--	--	--	--	--	--	--
IES-GN-1	Emergency Generator 1	--	--	0.50	0.58	0.029	0.029	0.029	0.0010	0.0015	100
IES-GN-2	Emergency Generator 2	--	--	0.14	2.46	0.0078	0.0078	0.0078	0.0018	1.68	192
IES-FWP	Fire Water Pump	--	--	0.43	0.49	0.025	0.025	0.025	8.16E-04	0.0013	85.9
IES-TK-1	Diesel Storage Tank for Emergency Generator #1	--	--	--	--	--	--	--	--	5.75E-04	--
IES-TK-2	Diesel Storage Tank for Fire Water Pump	--	--	--	--	--	--	--	--	1.60E-04	--
IES-TK-3	Mobile Fuel Diesel Storage Tank	--	--	--	--	--	--	--	--	0.0033	--
IES-TK-4	Diesel Storage Tank for Emergency Generator #2	--	--	--	--	--	--	--	--	5.75E-04	--
--	Haul Road Emissions	--	--	--	--	43.3	11.4	0.92	--	--	--
			Total Emissions:	**171.2**	**213.0**	**180.5**	**109.6**	**78.0**	**39.1**	**128.8**	**383,222**
			Total Excluding Fugitives[3]:	**171.2**	**213.0**	**120.0**	**89.4**	**75.4**	**39.1**	**120.3**	**383,222**
			PSD Major Source Threshold:	**250**	**250**	**250**	**250**	**250**	**250**	**250**	**--**
			Major Source?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**--**

Notes:

1. Each dryer line is routed to a separate RTO (CD-RTO-1 and CD-RTO-2). Although dryer line 1 and dryer line 2 are capable of processing up to 537,625 ODT/yr and 620,000 ODT/yr, respectively, the combined throughput of both dryers will not exceed 781,255 ODT/yr. In order to provide Enviva with the flexibility to use either dryer line up to its individual capacity, the total emissions from the two RTO's are based on the total facility throughput and are calculated as follows:
   - Where individual dryer emissions were calculated based on throughput (i.e. lb/ODT), the total emissions are estimated based on the total throughput of 781,255 ODT/yr, plus the emissions from the green hammermills.
   - Where individual dryer emissions were calculated based on fuel use (i.e. lb/MMBtu or lb/MMscf) or hourly test/vendor data (i.e., lb/hr), the total emissions are conservatively set equal to the sum of the emissions from the two dryer lines plus the emissions from the green hammermills assuming both dryer lines operate 8,760 hrs/yr.
2. Bark is transferred from the raw wood chip storage pile by walking floor to covered conveyors which transfer the material into the fully enclosed Green Wood Fuel Storage Bin. There are no emissions expected from transfer of material into the bin.
3. Fugitive emissions are not included in comparison against the major source threshold because the facility is not on the list of 28 source categories in 40 CFR 52.21.
4. As total VOC emissions are based on throughput, the calculated VOC emissions represent the total emissions from Dried Wood Handling 1 and 2 (ES-DWH-1 and ES-DWH-2).

Table 2
Facility-Wide HAP Emissions Summary
Enviva Pellets Northampton, LLC

Description	HAP	CD-RTO-1 and CD-RTO-2 [1] (tpy)	ES-FURNACE BYP-1 (tpy)	IES-DDB-1 and -2 (tpy)	ES-FURNACE BYP-2 (tpy)	IES-DDB-3 and -4 (tpy)	IES-PVAP (tpy)	CD-RCO-2 (tpy)	ES-DWH-1 and -2 (tpy)	IES-GN-1 (tpy)	IES-GN-2 (tpy)	IES-FWP (tpy)	IES-EPWC (tpy)	IES-BARK (tpy)	Total (tpy)	Major Source?
Acetaldehyde	Y	1.82E+00	2.62E-03	3.26E-07	2.64E-03	3.26E-07	-	4.92E-01	-	4.70E-04	2.96E-05	4.03E-04	-	-	2.32E+00	No
Acrolein	Y	1.34E+00	1.26E-02	3.86E-07	1.27E-02	3.86E-07	-	9.75E-01	-	5.67E-05	9.25E-06	4.86E-05	-	-	2.34E+00	No
Formaldehyde	Y	1.87E+00	1.39E-02	3.29E-02	1.40E-02	3.29E-02	6.57E-03	2.03E-01	3.28E-01	7.23E-04	9.26E-05	6.20E-04	-	-	2.50E+00	No
Methanol	Y	1.48E+00	-	-	-	-	-	4.14E-01	7.62E-01	-	-	-	3.91E-01	1.17E-01	3.16E+00	No
Phenol	Y	6.43E-01	1.61E-04	-	1.62E-04	-	-	4.92E-01	-	-	-	-	-	-	1.14E+00	No
Propionaldehyde	Y	5.47E-01	1.93E-04	-	1.94E-04	-	-	2.85E-01	8.20E-02	-	-	-	-	-	9.14E-01	No
Acetophenone	Y	1.24E-07	1.01E-08	-	1.02E-08	-	-	-	-	-	-	-	-	-	1.45E-07	No
Ammonia	N	6.82E-01	-	6.87E-02	-	6.87E-02	-	1.70E-01	-	-	-	-	-	-	9.89E-01	No
Antimony and compounds	Y	8.91E-04	2.49E-05	-	2.51E-05	-	-	-	-	-	-	-	-	-	9.41E-04	No
Arsenic	Y	2.52E-03	6.95E-05	4.29E-06	6.99E-05	4.29E-06	-	1.06E-05	-	-	-	-	-	-	2.68E-03	No
Benzene	Y	3.18E-01	-	1.55E-02	-	1.55E-02	3.11E-03	3.86E-02	-	5.71E-04	9.11E-04	4.90E-04	-	-	3.92E-01	No
Benzo(a)pyrene	Y	1.01E-04	8.21E-06	2.58E-08	8.26E-06	2.58E-08	-	6.39E-08	-	2.39E-05	3.02E-07	9.87E-08	-	-	1.42E-04	No
Beryllium	Y	1.27E-04	3.47E-06	2.58E-07	3.49E-06	2.58E-07	-	6.39E-07	-	-	-	-	-	-	1.35E-04	No
1,3-Butadiene	Y	-	-	-	-	-	-	-	-	2.39E-05	-	2.05E-05	-	-	4.45E-05	No
Cadmium	Y	6.97E-04	1.29E-05	2.36E-05	1.30E-05	2.36E-05	-	5.86E-05	-	-	-	-	-	-	8.29E-04	No
Carbon tetrachloride	Y	1.75E-03	1.42E-04	-	1.43E-04	-	-	-	-	-	-	-	-	-	2.04E-03	No
Chlorine	Y	1.23E+00	2.49E-03	-	2.51E-03	-	-	-	-	-	-	-	-	-	1.23E+00	No
Chlorobenzene	Y	1.28E-03	1.04E-04	-	1.05E-04	-	-	-	-	-	-	-	-	-	1.49E-03	No
Chloroform	Y	1.09E-03	-	-	-	-	-	-	-	-	-	-	-	-	1.09E-03	No
Chromium VI	Y	6.93E-04	-	3.01E-05	-	3.01E-05	-	7.45E-05	-	-	-	-	-	-	8.28E-04	No
Chromium–Other compounds	Y	1.97E-03	6.63E-05	-	6.67E-05	-	-	-	-	-	-	-	-	-	2.11E-03	No
Cobalt compounds	Y	7.33E-04	2.05E-05	-	2.06E-05	-	-	4.47E-06	-	-	-	-	-	-	7.79E-04	No
Dichlorobenzene	Y	2.56E-04	-	2.58E-05	-	2.58E-05	-	6.39E-05	-	-	-	-	-	-	3.71E-04	No
Dichloroethane, 1,2-	Y	1.13E-03	9.16E-05	-	9.21E-05	-	-	-	-	-	-	-	-	-	1.31E-03	No
Dichloropropane, 1,2-	Y	1.28E-03	1.04E-04	-	1.05E-04	-	-	-	-	-	-	-	-	-	1.49E-03	No
Dinitrophenol, 2,4-	Y	7.00E-06	5.68E-07	-	5.72E-07	-	-	-	-	-	-	-	-	-	8.14E-06	No
Di(2-ethylhexyl)phthalate	Y	1.83E-06	3.09E-08	-	3.17E-08	-	-	-	-	-	-	-	-	-	1.89E-06	No
Ethyl benzene	Y	1.21E-03	9.79E-05	-	9.84E-05	-	-	-	-	-	-	-	-	-	1.40E-03	No
Hexachlorodibenzo-p-dioxin, 1,2,3,6,7,8-	N	6.96E-10	-	-	-	-	-	-	-	-	-	-	-	-	6.96E-10	No
Hexane	Y	3.83E-01	-	3.86E-02	-	3.86E-02	-	9.58E-02	-	-	-	-	-	-	5.57E-01	No
Indeno(1,2,3-cd)pyrene	Y	3.83E-07	-	3.86E-08	-	3.86E-08	-	9.58E-08	-	-	-	-	-	-	5.57E-07	No
Hydrochloric acid	Y	2.96E+00	6.00E-02	-	6.03E-02	-	-	-	-	-	-	-	-	-	3.08E+00	No
Lead	Y	5.52E-03	-	1.07E-05	-	1.07E-05	-	2.66E-05	-	-	-	-	-	-	5.57E-03	No
Manganese	Y	1.81E-01	5.05E-03	8.16E-06	5.08E-03	8.16E-06	-	2.02E-05	-	-	-	-	-	-	1.91E-01	No
Mercury	Y	4.50E-04	1.11E-05	5.58E-06	1.11E-05	5.58E-06	-	1.38E-05	-	-	-	-	-	-	4.97E-04	No
Methyl bromide	Y	5.84E-04	4.74E-05	-	4.76E-05	-	-	-	-	-	-	-	-	-	6.79E-04	No
Methyl chloride	Y	8.95E-04	7.26E-05	-	7.30E-05	-	-	-	-	-	-	-	-	-	1.04E-03	No
Methyl ethyl ketone	N	2.10E-04	-	-	-	-	-	-	-	-	-	-	-	-	2.10E-04	No
3-Methylchloranthrene	Y	3.83E-07	-	3.86E-08	-	3.86E-08	-	9.58E-08	-	-	-	-	-	-	5.57E-07	No
Methylene chloride	Y	1.13E-02	-	-	-	-	-	-	-	-	-	-	-	-	1.13E-02	No
Naphthalene	Y	3.91E-03	3.06E-04	1.31E-05	3.08E-04	1.31E-05	-	3.25E-05	-	-	1.53E-04	-	-	-	4.73E-03	No
Nickel	Y	4.17E-03	1.04E-04	4.51E-05	1.05E-04	4.51E-05	-	1.12E-04	-	-	-	-	-	-	4.58E-03	No
Nitrophenol, 4-	Y	4.28E-06	3.47E-07	-	3.49E-07	-	-	-	-	-	-	-	-	-	4.98E-06	No
Pentachlorophenol	Y	1.98E-06	1.61E-07	-	1.62E-07	-	-	-	-	-	-	-	-	-	2.31E-06	No
Perchloroethylene	Y	1.48E-03	1.20E-04	-	1.21E-04	-	-	-	-	-	-	-	-	-	1.72E-03	No
Phosphorus metal, yellow or white	Y	3.05E-03	8.52E-05	-	8.57E-05	-	-	-	-	-	-	-	-	-	3.22E-03	No
Polychlorinated biphenyls	Y	3.17E-07	2.57E-08	-	2.59E-08	-	-	-	-	-	-	-	-	-	3.69E-07	No
Polycyclic Organic Matter	Y	1.36E-02	3.95E-04	8.76E-04	3.97E-04	8.76E-04	1.75E-04	2.17E-03	-	1.03E-04	2.49E-04	8.82E-05	-	-	1.89E-02	No
Selenium compounds	Y	3.21E-04	8.84E-06	5.15E-07	8.89E-06	5.15E-07	-	1.28E-06	-	-	-	-	-	-	3.41E-04	No
Styrene	Y	7.39E-02	-	-	-	-	-	-	-	-	-	-	-	-	7.39E-02	No
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	Y	3.35E-10	2.72E-11	-	2.73E-11	-	-	-	-	-	-	-	-	-	3.89E-10	No
Toluene	Y	1.89E-03	-	7.30E-05	-	7.30E-05	-	1.81E-04	-	2.51E-04	3.30E-04	2.15E-04	-	-	3.01E-03	No
Trichloroethane, 1,1,1-	Y	1.21E-03	9.79E-05	-	9.84E-05	-	-	-	-	-	-	-	-	-	1.40E-03	No
Trichloroethylene	Y	1.17E-03	1.97E-05	-	2.03E-05	-	-	-	-	-	-	-	-	-	1.21E-03	No
Trichlorofluoromethane	N	1.60E-03	-	-	-	-	-	-	-	-	-	-	-	-	1.60E-03	No
Trichlorophenol, 2,4,6-	Y	8.56E-07	6.95E-08	-	6.99E-08	-		-	-	-	-	-	-	-	9.95E-07	No
Vinyl chloride	Y	7.00E-04	5.68E-05	-	5.72E-05	-	-	-	-	-	-	-	-	-	8.14E-04	No
Xylene	Y	9.73E-04	-	-	-	-	-	-	-	1.75E-04	2.26E-04	1.50E-04	-	-	1.52E-03	No
TOTAL HAP		**12.9**	**0.099**	**0.088**	**0.099**	**0.088**	**0.010**	**3.00**	**1.17**	**0.0024**	**0.0018**	**0.0020**	**0.39**	**0.12**	**18.0**	No

Notes:

[1] Each dryer line is routed to a separate RTO (CD-RTO-1 and CD-RTO-2). Although dryer line 1 and dryer line 2 are capable of processing up to 537,625 ODT/yr and 620,000 ODT/yr, respectively, the combined throughput of both dryers will not exceed 781,255 ODT/yr. In order to provide Enviva with the flexibility to use either dryer line up to its individual capacity, the total emissions from the two RTO's are based on the total facility throughput and are calculated as follows:
- Where individual dryer emissions were calculated based on throughput (i.e. lb/ODT), the total emissions are estimated based on the total throughput of 781,255 ODT/yr, plus the emissions from the green hammermills.
- Where individual dryer emissions were calculated based on fuel use (i.e. lb/MMBtu or lb/MMscf) or hourly test/vendor data (i.e., lb/hr), the total emissions are conservatively set equal to the sum of the emissions from the two dryer lines plus the emissions from the green hammermills assuming both dryer lines operate 8,760 hrs/yr.

Table 3
Potential Emissions Summary
RTO #1 and #2 (CD-RTO-1 and CD-RTO-2)
Enviva Pellets Northampton, LLC

Description: Potential emissions for the RTOs include the sum of emissions from the dryer/furnace (ES-DRYER-1), Green Hammermills, Dry Hammermills, and Dry Shavings Hammermills as estimated in Tables 3a through 3d, 4a, and 4b. This includes combustion emissions from fuel and vent gases, particulate emissions, VOC, and HAPs.

Summary of Potential Emissions for CD-RTO-1 and CD-RTO-2

Pollutant	Max (lb/hr)	Annual (tpy)
CO	33.11	157.04
NOx	44.79	195.68
SO_2	8.88	38.91
PM	15.43	67.59
PM_{10}	15.43	67.59
$PM_{2.5}$	15.29	66.98
VOC	9.92	38.75
Acetaldehyde	4.09E-01	1.82E+00
Acrolein	3.24E-01	1.34E+00
Formaldehyde	4.17E-01	1.87E+00
Methanol	1.70E-01	1.48E+00
Phenol	2.93E-02	6.43E-01
Propionaldehyde	5.78E-02	5.47E-01
Acetophenone	2.84E-08	1.24E-07
Ammonia	1.56E-01	6.82E-01
Antimony and compounds	2.03E-04	8.91E-04
Arsenic	5.76E-04	2.52E-03
Benzene	7.25E-02	3.18E-01
Benzo(a)pyrene	2.32E-05	1.01E-04
Beryllium	2.89E-05	1.27E-04
Cadmium	1.59E-04	6.97E-04
Carbon tetrachloride	4.00E-04	1.75E-03
Chlorine	2.81E-01	1.23E+00
Chlorobenzene	2.93E-04	1.28E-03
Chloroform	2.49E-04	1.09E-03
Chromium VI	1.58E-04	6.93E-04
Chromium–Other compounds	4.51E-04	1.97E-03
Cobalt compounds	1.67E-04	7.33E-04
Dichlorobenzene	5.84E-05	2.56E-04
Dichloroethane, 1,2-	2.58E-04	1.13E-03
Dichloropropane, 1,2-	2.93E-04	1.28E-03
Dinitrophenol, 2,4-	1.60E-06	7.00E-06

Table 3
Potential Emissions Summary
RTO #1 and #2 (CD-RTO-1 and CD-RTO-2)
Enviva Pellets Northampton, LLC

Description: Potential emissions for the RTOs include the sum of emissions from the dryer/furnace (ES-DRYER-1), Green Hammermills, Dry Hammermills, and Dry Shavings Hammermills as estimated in Tables 3a through 3d, 4a, and 4b. This includes combustion emissions from fuel and vent gases, particulate emissions, VOC, and HAPs.

Summary of Potential Emissions for CD-RTO-1 and CD-RTO-2

Pollutant	Max (lb/hr)	Annual (tpy)
Di(2-ethylhexyl)phthalate	4.17E-07	1.83E-06
Ethyl benzene	2.75E-04	1.21E-03
Hexachlorodibenzo-p-dioxin, 1,2,3,6,7,8-	1.59E-10	6.96E-10
Hexane	8.75E-02	3.83E-01
Indeno(1,2,3-cd)pyrene	8.75E-08	3.83E-07
Hydrochloric acid	6.75E-01	2.96E+00
Lead	1.26E-03	5.52E-03
Manganese	4.12E-02	1.81E-01
Mercury	1.03E-04	4.50E-04
Methyl bromide	1.33E-04	5.84E-04
Methyl chloride	2.04E-04	8.95E-04
Methyl ethyl ketone	4.80E-05	2.10E-04
3-Methylchloranthrene	8.75E-08	3.83E-07
Methylene chloride	2.58E-03	1.13E-02
Naphthalene	8.91E-04	3.91E-03
Nickel	9.52E-04	4.17E-03
Nitrophenol, 4-	9.77E-07	4.28E-06
Pentachlorophenol	4.53E-07	1.98E-06
Perchloroethylene	3.38E-04	1.48E-03
Phosphorus metal, yellow or white	6.95E-04	3.05E-03
Polychlorinated biphenyls	7.24E-08	3.17E-07
Polycyclic Organic Matter	3.09E-03	1.36E-02
Selenium compounds	7.33E-05	3.21E-04
Styrene	1.69E-02	7.39E-02
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	7.64E-11	3.35E-10
Toluene	4.32E-04	1.89E-03
Trichloroethane, 1,1,1-	2.75E-04	1.21E-03
Trichloroethylene	2.66E-04	1.17E-03
Trichlorofluoromethane	3.64E-04	1.60E-03
Trichlorophenol, 2,4,6-	1.95E-07	8.56E-07
Vinyl chloride	1.60E-04	7.00E-04
Xylene	2.22E-04	9.73E-04

Table 3a
Potential Criteria Emissons
Dryer #1 (ES-DRYER-1, CD-WESP-1, CD-RTO-1)
Enviva Pellets Northampton, LLC

Calculation Basis

Annual Dried Wood Throughput[1]	781,255 ODT/year
Max. Hourly Dried Wood Throughput of Dryer	71.71 ODT/hr
Burner Heat Input	175.3 MMBtu/hr
Percent Hardwood	20.0%
Percent Softwood	80.0%
Annual Operation	8,760 hr/yr
Annual Heat Input	1,535,628 MMBtu/yr
Number of RTO Burners	4
RTO Burner Rating	6.2 MMBtu/hr
RTO Control Efficiency	97.50%

Potential Criteria Emissions

Pollutant	Biomass Emission Factor	Units	Emission Factor Source	Uncontrolled Emissions		Controlled Emissions	
				Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)
CO	0.4	lb/ODT	Note 2	--	--	28.68	156.3
NO_X	22.23	lb/hr	Note 2	--	--	22.23	97.4
$PM/PM_{10}/PM_{2.5}$ (Filterable + Condensable)	7.6	lb/hr	Note 4	--	--	7.60	33.3
SO_2	0.025	lb/MMBtu	AP-42, Section 1.6[3]	--	--	4.38	19.2
Total VOC (as propane)	2.64	lb/ODT	Note 5	189.31	1031.3	4.73	25.8

Notes:

[1] Annual dried wood throughput is based on total facility production. Although dryer line 1 and dryer line 2 are capable of processing up to 537,625 ODT/yr and 620,000 ODT/yr, respectively, the combined throughput of both dryers will not exceed 781,255 ODT/yr. In order to to provide Enviva with the flexibility to use either dryer line up to its individual capacity, the total emissions from the two dryer lines are based on the total facility throughput and calculated as follows:
- Where individual dryer emissions are calculated based on throughput (i.e. lb/ODT), the total emissions are estimated based on the total throughput of 781,255 ODT/yr.
- Where individual dryer emissions are calculated based on fuel use (i.e. lb/MMBtu or lb/MMscf) or hourly test/vendor data (i.e., lb/hr), the total emissions are conservatively set equal to the sum of the emissions from the two dryer lines assuming both dryer lines operate 8,760 hrs/yr.
- The total furnace heat input is listed as 175.3 MMBtu/hr. This is equal to the sum of 155.3 MMBtu/hr from the grate and 2 additional 10 MMBtu/hr dust burners which have been permitted but not installed.

[2] Emissions based on process knowledge and/or information from NCASI database and includes appropriate contingency based on engineering judgement.

[3] No emission factor is provided in AP-42, Section 10.6.2 for SO_2 for rotary dryers. Enviva has conservatively calculated SO_2 emissions based upon the heat input of the dryer burners using an emission factor for wood combustion from AP-42, Section 1.6.

[4] Particulate emission factor is based on process knowledge and an appropriate contingency based on engineering judgement.

[5] VOC emission factor based on process knowledge and an appropriate contingency based on engineering judgement. Factor represents uncontrolled emissions.

Table 3a
Potential Criteria Emissons
Dryer #1 (ES-DRYER-1, CD-WESP-1, CD-RTO-1)
Enviva Pellets Northampton, LLC

Abbreviations:

hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
RTO - regenerative thermal oxidizer
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
WESP - wet electrostatic precipitator
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.
U.S. EPA. AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

Table 3bi
Potential VOC Emissons
Green Hammermills (ES-GHM-1 through ES-GHM-5, CD-WESP-1, CD-RTO-1 or CD-WESP-2, CD-RTO-2)
Enviva Pellets Northampton, LLC

Calculation Basis

Hourly Throughput[1]	150.0 ODT/hr
Annual Throughput	781,255 ODT/yr
Hours of Operation	8,760 hr/yr
RTO Control Efficiency	97.50%

Potential VOC Emissions

Pollutant	CAS No.	HAP	NC TAP	VOC	Emission Factor[2]	Potential Emissions[3]	
					(lb/ODT)	Max (lb/hr)	Annual (tpy)
Acetaldehyde	75-07-0	Y	Y	Y	8.4E-03	0.032	0.082
Acrolein	107-02-8	Y	Y	Y	1.6E-02	0.059	0.15
Formaldehyde	50-00-0	Y	Y	Y	4.8E-03	0.018	0.047
Methanol	67-56-1	Y	N	Y	3.7E-02	0.140	0.36
Phenol	108-95-2	Y	Y	Y	4.6E-03	0.017	0.045
Propionaldehyde	123-38-6	Y	N	Y	1.2E-03	0.005	0.012
					Total TAP Emissions	0.125	0.326
					Total HAP Emissions	**0.27**	**0.70**
Total VOC (as propane)	--	N/A	N/A	Y	0.32	1.21	3.15

Notes:

1. The max hourly throughput is based on the maximum capacity for the 2 existing green hammermills ratioed up to reflect 3 additional hammermills (i.e. 119.4 tph * 5/2 * (1 - 50% moisture content) = 150 ODT/hr).
2. Emission factors based on process knowledge and an appropriate contingency based on engineering judgement. The emission factors represent uncontrolled emissions.
3. The emissions from the green hammermills will primarily be controlled by the RTO on the existing dryer line (CD-RTO-1). During periods when the existing dryer line is down, the emissions from the green hammermills will be controlled by the RTO on the new dryer line (CD-RTO-2).

Thermally Generated Potential Criteria Pollutant Emissions

Maximum high heating value of VOC constituents	0.018	MMBtu/lb
Uncontrolled VOC emissions	126	tons/yr
Uncontrolled VOC emissions	48	lb/hr
Heat input of uncontrolled VOC emissions	4,666	MMBtu/yr
Heat input of uncontrolled VOC emissions	0.9	MMBtu/hr

Pollutant	Emission Factor	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	8.2E-02	lb/MMBtu[1]	0.07	0.19
NO_X	9.8E-02	lb/MMBtu[1]	0.09	0.23

Notes:

1. CO and NO_x emission factors are from AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98 for small boilers.

Abbreviations:

CAS - chemical abstract service
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
ODT - oven dried tons
RTO - Regenerative Thermal Oxidizer
TAP - toxic air pollutant
tph - tons per hour
tpy - tons per year
VOC - volatile organic compound
WESP - wet electrostatic precipitator
yr - year

Reference:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.

Table 3bii
Potential Emissions at Outlet of RTO-1 Stack (CD-RTO-1)
Dry Hammermills (ES-HM-1 through ES-HM-8)
Enviva Pellets Northampton, LLC

Calculation Basis

Total Plant Throughput	781,255	ODT/yr
% of Total Throughput to the Hammermills	100%	
Hours of Operation	8760	hr/yr

Hammermills Annual Throughput	781,255	ODT/yr
Hammermills Hourly Throughput	144	ODT/hr
Number of RTO Burners	4	
RTO Burner Rating	6.2	MMBtu/hr
Control Efficiency[1]	97.5%	

Potential VOC and HAP Emissions

Pollutant	CAS No.	HAP	NC TAP	VOC	Emission Factor[2] (lb/ODT)	Potential Emissions[3] Max (lb/hr)	Potential Emissions[3] Annual (tpy)
Acetaldehyde	75-07-0	Y	Y	Y	0.0073	0.026	0.071
Acrolein	107-02-8	Y	Y	Y	0.0092	0.033	0.090
Formaldehyde	50-00-0	Y	Y	Y	0.0071	0.026	0.069
Methanol	67-56-1	Y	N	Y	0.0071	0.026	0.069
Phenol	108-95-2	Y	Y	Y	0.0028	0.010	0.027
Propionaldehyde	123-38-6	Y	N	Y	0.012	0.045	0.12
					Total HAP Emissions	**0.17**	**0.45**
					Total TAP Emissions	**0.10**	**0.26**
Total VOC (as propane)	--		--	Y	0.77	2.75	7.47

Notes:

1. A 97.5% control efficiency is applied to the potential emissions for the RTO.
2. Emission factors based on process knowledge and an appropriate contingency based on engineering judgement. The emission factors represent uncontrolled emissions.
3. The emissions from the dry hammermills will be routed to the Dryer 1 Furnace, Dryer 1 WESP, or a combination of the two then controlled by the RTO on the existing dryer line (CD-RTO-1).

Thermally Generated Potential Criteria Pollutant Emissions

Maximum high heating value of VOC constituents	0.018	MMBtu/lb
Uncontrolled VOC emissions	299	tons/yr
Uncontrolled VOC emissions	110	lb/hr
Heat input of uncontrolled VOC emissions	11,054	MMBtu/yr
Heat input of uncontrolled VOC emissions	2	MMBtu/hr

Pollutant	Emission Factor[1]	Units	Potential Emissions Max (lb/hr)	Potential Emissions Annual (tpy)
CO	0.082	lb/MMBtu	0.17	0.46
NO_X	0.098	lb/MMBtu	0.20	0.54

Notes:

1. Emission factor for CO and NOx from AP-42, Section 1.4 - Natural Gas Combustion, 07/98. Emission factors converted from lb/MMscf to lb/MMBtu based on assumed heating value of 1,020 Btu/scf for natural gas per AP-42 Section 1.4.

Abbreviations:

CAS - chemical abstract service
CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
NO_X - nitrogen oxides
ODT - oven dried tons
RTO - Regenerative Thermal Oxidizer
TAP - toxic air pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.

Table 3biii
Potential Emissions at Outlet of RTO-1 Stack (CD-RTO-1)
Dry Shavings Hammermills (ES-DSHM-1 and -2)
Enviva Pellets Northampton, LLC

Calculation Basis

Hammermills Hourly Throughput	28	ODT/hr
Hammermills Annual Throughput	245,000	ODT/yr
RTO Control Efficiency[1]	97.5%	

Potential PM, VOC, and HAP Emissions

Pollutant	CAS No.	HAP	NC TAP	VOC	Emission Factor[2]	Potential Emissions[3]	
					(lb/ODT)	Max (lb/hr)	Annual (tpy)
Acetaldehyde	75-07-0	Y	Y	Y	0.0073	0.0051	0.022
Acrolein	107-02-8	Y	Y	Y	0.0092	0.0064	0.028
Formaldehyde	50-00-0	Y	Y	Y	0.0071	0.0050	0.022
Methanol	67-56-1	Y	N	Y	0.0071	0.0050	0.022
Phenol	108-95-2	Y	Y	Y	0.0028	0.0020	0.009
Propionaldehyde	123-38-6	Y	N	Y	0.0124	0.0087	0.038
					Total HAP Emissions	**0.032**	**0.14**
					Total TAP Emissions	**0.018**	**0.081**
Total VOC (as propane)	--		--	Y	0.765	0.53	2.34

Notes:

1. A 97.5% control efficiency is applied to the potential emissions for the RTO.
2. Emission factors based on process knowledge and an appropriate contingency based on engineering judgement. The emission factors represent uncontrolled emissions.
3. The emissions from the two dry shavings hammermills will be routed to the Dryer 1 Furnace, Dryer 1 WESP, or a combination of the two then controlled by the RTO on the existing dryer line (CD-RTO-1).

Thermally Generated Potential Criteria Pollutant Emissions

Maximum high heating value of VOC constituents	0.018	MMBtu/lb
Uncontrolled VOC emissions	94	tons/yr
Uncontrolled VOC emissions	21	lb/hr
Heat input of uncontrolled VOC emissions	3,467	MMBtu/yr
Heat input of uncontrolled VOC emissions	0.40	MMBtu/hr

Pollutant	Emission Factor[1]	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	0.082	lb/MMBtu	0.033	0.14
NO_X	0.098	lb/MMBtu	0.039	0.17

Notes:

1. Emission factor for CO and NOx from AP-42, Section 1.4 - Natural Gas Combustion, 07/98. Emission factors converted from lb/MMscf to lb/MMBtu based on assumed heating value of 1,020 Btu/scf for natural gas per AP-42 Section 1.4.

Abbreviations:

CAS - chemical abstract service
CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
NO_X - nitrogen oxides
ODT - oven dried tons
RTO - Regenerative Thermal Oxidizer
TAP - toxic air pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.

Table 3c
Potential HAP and TAP Emissions
Dryer #1 (ES-DRYER-1, CD-WESP-1, CD-RTO-1)
Enviva Pellets Northampton, LLC

Calculation Basis

Annual Dried Wood Throughput[10]	781,255	ODT/year
Max. Hourly Dried Wood Throughput of Dryer	71.71	ODT/hr
Burner Heat Input	175.3	MMBtu/hr
Percent Hardwood	20.0%	
Percent Softwood	80.0%	
Annual Operation	8,760	hr/yr
Annual Heat Input	1,535,628	MMBtu/yr
Number of RTO Burners	4	
RTO Burner Rating	6.2	MMBtu/hr
RTO Control Efficiency	97.50%	

Potential HAP and TAP Emissions

Pollutant	HAP	NC TAP	VOC	Emission Factor	Units	Footnote	Potential Emissions	
							Max (lb/hr)	Annual (tpy)
Dryer Burner - Biomass Source								
Acetaldehyde	Y	Y	Y	1.7E-01	lb/ODT	1	0.30	1.64
Acrolein	Y	Y	Y	1.1E-01	lb/ODT	1	0.20	1.07
Formaldehyde	Y	Y	Y	1.4E-01	lb/ODT	1	0.26	1.40
Methanol	Y	N	Y	1.0E-01	lb/ODT	1	0.19	1.02
Phenol	Y	Y	Y	5.8E-02	lb/ODT	1	0.10	0.56
Propionaldehyde	Y	N	Y	3.9E-02	lb/ODT	1	0.07	0.38
Acetophenone	Y	N	Y	3.2E-09	lb/MMBtu	2,3	1.4E-08	6.1E-08
Antimony and compounds	Y	N	N	7.9E-06	lb/MMBtu	2,4	1.0E-04	4.4E-04
Arsenic	Y	Y	N	2.2E-05	lb/MMBtu	2,4	2.8E-04	1.2E-03
Benzene	Y	Y	Y	4.2E-03	lb/MMBtu	2,3	1.8E-02	8.1E-02
Benzo(a)pyrene	Y	Y	Y	2.6E-06	lb/MMBtu	2,3	1.1E-05	5.0E-05
Beryllium	Y	Y	N	1.1E-06	lb/MMBtu	2,4	1.4E-05	6.1E-05
Cadmium	Y	Y	N	4.1E-06	lb/MMBtu	2,4	5.2E-05	2.3E-04
Carbon tetrachloride	Y	Y	Y	4.5E-05	lb/MMBtu	2,3	2.0E-04	8.6E-04
Chlorine	Y	Y	N	7.9E-04	lb/MMBtu	2,9	1.4E-01	6.1E-01
Chlorobenzene	Y	Y	Y	3.3E-05	lb/MMBtu	2,3	1.4E-04	6.3E-04
Chloroform	Y	Y	Y	2.8E-05	lb/MMBtu	2,3	1.2E-04	5.4E-04
Chromium VI	-[5]	Y	N	3.5E-06	lb/MMBtu	2,4,5	4.4E-05	1.9E-04
Chromium–Other compounds	Y	N	N	1.8E-05	lb/MMBtu	2,4	2.2E-04	9.7E-04
Cobalt compounds	Y	N	N	6.5E-06	lb/MMBtu	2,4	8.3E-05	3.6E-04
Dichloroethane, 1,2-	Y	Y	Y	2.9E-05	lb/MMBtu	2,3	1.3E-04	5.6E-04
Dichloropropane, 1,2-	Y	N	Y	3.3E-05	lb/MMBtu	2,3	1.4E-04	6.3E-04
Dinitrophenol, 2,4-	Y	N	Y	1.8E-07	lb/MMBtu	2,3	7.9E-07	3.5E-06
Di(2-ethylhexyl)phthalate	Y	Y	Y	4.7E-08	lb/MMBtu	2,3	2.1E-07	9.0E-07
Ethyl benzene	Y	N	Y	3.1E-05	lb/MMBtu	2,3	1.4E-04	6.0E-04
Hexachlorodibenzo-p-dioxin, 1,2,3,6,7,8-	N	Y	Y	1.8E-11	lb/MMBtu	2,3	7.8E-11	3.4E-10
Hydrochloric acid	Y	Y	N	1.9E-02	lb/MMBtu	2,6	3.3E-01	1.5E+00
Lead	Y	N	N	4.8E-05	lb/MMBtu	2,4	6.1E-04	2.7E-03
Manganese	Y	Y	N	1.6E-03	lb/MMBtu	2,4	2.0E-02	8.9E-02
Mercury	Y	Y	N	3.5E-06	lb/MMBtu	2,4	4.4E-05	1.9E-04
Methyl bromide	Y	N	Y	1.5E-05	lb/MMBtu	2,3	6.6E-05	2.9E-04
Methyl chloride	Y	N	Y	2.3E-05	lb/MMBtu	2,3	1.0E-04	4.4E-04
Methyl ethyl ketone	N	Y	Y	5.4E-06	lb/MMBtu	2,3	2.4E-05	1.0E-04
Methylene chloride	Y	Y	Y	2.9E-04	lb/MMBtu	2,3	1.3E-03	5.6E-03
Naphthalene	Y	N	Y	9.7E-05	lb/MMBtu	2,3	4.3E-04	1.9E-03
Nickel	Y	Y	N	3.3E-05	lb/MMBtu	2,4	4.2E-04	1.8E-03
Nitrophenol, 4-	Y	N	Y	1.1E-07	lb/MMBtu	2,3	4.8E-07	2.1E-06
Pentachlorophenol	Y	Y	N	5.1E-08	lb/MMBtu	2	2.2E-07	9.8E-07
Perchloroethylene	Y	Y	N	3.8E-05	lb/MMBtu	2	1.7E-04	7.3E-04
Phosphorus metal, yellow or white	Y	N	N	2.7E-05	lb/MMBtu	2,4	3.4E-04	1.5E-03
Polychlorinated biphenyls	Y	Y	Y	8.2E-09	lb/MMBtu	2,3	3.6E-08	1.6E-07
Polycyclic Organic Matter	Y	N	N	1.3E-04	lb/MMBtu	2	5.5E-04	2.4E-03
Selenium compounds	Y	N	N	2.8E-06	lb/MMBtu	2,4	3.6E-05	1.6E-04
Styrene	Y	Y	Y	1.9E-03	lb/MMBtu	2,3	8.3E-03	3.6E-02
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	Y	Y	Y	8.6E-12	lb/MMBtu	2,3	3.8E-11	1.7E-10
Toluene	Y	Y	Y	3.0E-05	lb/MMBtu	2,3	1.3E-04	5.8E-04
Trichloroethane, 1,1,1-	Y	Y	N	3.1E-05	lb/MMBtu	2	1.4E-04	6.0E-04
Trichloroethylene	Y	Y	Y	3.0E-05	lb/MMBtu	2,3	1.3E-04	5.8E-04
Trichlorofluoromethane	N	Y	Y	4.1E-05	lb/MMBtu	2,3	1.8E-04	7.9E-04
Trichlorophenol, 2,4,6-	Y	N	Y	2.2E-08	lb/MMBtu	2,3	9.6E-08	4.2E-07
Vinyl chloride	Y	Y	Y	1.8E-05	lb/MMBtu	2,3	7.9E-05	3.5E-04
Xylene	Y	Y	Y	2.5E-05	lb/MMBtu	2,3	1.1E-04	4.8E-04
					Total HAP Emissions (related to biomass)		**1.64**	**8.38**
					Total TAP Emissions (related to biomass)		**1.38**	**6.97**

Table 3c
Potential HAP and TAP Emissions
Dryer #1 (ES-DRYER-1, CD-WESP-1, CD-RTO-1)
Enviva Pellets Northampton, LLC

Pollutant	HAP	NC TAP	VOC	Emission Factor	Units	Footnote	Potential Emissions	
							Max (lb/hr)	Annual (tpy)
RTO - Natural Gas/Propane Source								
2-Methylnaphthalene	Y	N	Y	2.4E-05	lb/MMscf	7	5.8E-07	2.6E-06
3-Methylchloranthrene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
7,12-Dimethylbenz(a)anthracene	Y	N	Y	1.6E-05	lb/MMscf	7	3.9E-07	1.7E-06
Acenaphthene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
Acenaphthylene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
Acetaldehyde	Y	Y	Y	1.5E-05	lb/MMscf	7	3.7E-07	1.6E-06
Acrolein	Y	Y	Y	1.8E-05	lb/MMscf	7	4.4E-07	1.9E-06
Ammonia	N	Y	N	3.2	lb/MMscf	7	7.8E-02	3.4E-01
Anthracene	Y	N	Y	2.4E-06	lb/MMscf	7	5.8E-08	2.6E-07
Arsenic	Y	Y	N	2.0E-04	lb/MMscf	7	4.9E-06	2.1E-05
Benz(a)anthracene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
Benzene	Y	N	Y	7.1E-04	lb/MMBtu	8	1.8E-02	7.7E-02
Benzo(a)pyrene	Y	Y	Y	1.2E-06	lb/MMscf	7	2.9E-08	1.3E-07
Benzo(b)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
Benzo(g,h,i)perylene	Y	N	Y	1.2E-06	lb/MMscf	7	2.9E-08	1.3E-07
Benzo(k)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
Beryllium	Y	Y	N	1.2E-05	lb/MMscf	7	2.9E-07	1.3E-06
Cadmium	Y	Y	N	1.1E-03	lb/MMscf	7	2.7E-05	1.2E-04
Chromium VI	Y	N	N	1.4E-03	lb/MMscf	7	3.4E-05	1.5E-04
Chrysene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
Cobalt	Y	N	N	8.4E-05	lb/MMscf	7	2.0E-06	8.9E-06
Dibenzo(a,h)anthracene	Y	N	Y	1.2E-06	lb/MMscf	7	2.9E-08	1.3E-07
Dichlorobenzene	Y	Y	Y	1.2E-03	lb/MMscf	7	2.9E-05	1.3E-04
Fluoranthene	Y	N	Y	3.0E-06	lb/MMscf	7	7.3E-08	3.2E-07
Fluorene	Y	N	Y	2.8E-06	lb/MMscf	7	6.8E-08	3.0E-07
Formaldehyde	Y	Y	Y	1.5E-03	lb/MMBtu	8	3.7E-02	1.6E-01
Hexane	Y	Y	Y	1.8	lb/MMscf	7	4.4E-02	1.9E-01
Indeno(1,2,3-cd)pyrene	Y	N	Y	1.8E-06	lb/MMscf	7	4.4E-08	1.9E-07
Lead	Y	N	N	5.0E-04	lb/MMscf	7	1.2E-05	5.3E-05
Manganese	Y	Y	N	3.8E-04	lb/MMscf	7	9.2E-06	4.0E-05
Mercury	Y	Y	N	2.6E-04	lb/MMscf	7	6.3E-06	2.8E-05
Naphthalene	Y	N	Y	6.1E-04	lb/MMscf	7	1.5E-05	6.5E-05
Nickel	Y	Y	N	2.1E-03	lb/MMscf	7	5.1E-05	2.2E-04
Polycyclic Organic Matter	Y	N	N	4.0E-05	lb/MMBtu	8	9.9E-04	4.3E-03
Phenanthrene	Y	N	Y	1.7E-05	lb/MMscf	7	4.1E-07	1.8E-06
Pyrene	Y	N	Y	5.0E-06	lb/MMscf	7	1.2E-07	5.3E-07
Selenium compounds	Y	N	N	2.4E-05	lb/MMscf	7	5.8E-07	2.6E-06
Toluene	Y	Y	Y	3.4E-03	lb/MMscf	7	8.3E-05	3.6E-04
					Total HAP Emissions (related to natural gas/propane)		**0.10**	**0.44**
					Total TAP Emissions (related to natural gas/propane)		**0.16**	**0.36**

Notes:

1. Emission factors based on process knowledge and an appropriate contingency based on engineering judgement. The emission factors represent uncontrolled emissions.

2. Emission factors (criteria and HAP/TAP) for wood combustion in a stoker boiler from NCDAQ Wood Waste Combustion Spreadsheet/AP-42, Fifth Edition, Volume 1, Chapter 1.6 - Wood Residue Combustion in Boilers, 09/03.

3. The control efficiency of 97.5% for the RTO is applied to all VOC hazardous and toxic pollutants.

4. The control efficiency of the wet electrostatic precipitator (WESP) for filterable particulate matter is applied to all metal hazardous and toxic pollutants from the dryer and duct burners. Actual design filterable efficiency is estimated to 96.4%, but 92.75% is assumed for toxics permitting.

   WESP Control Efficiency for metal HAP 92.8%

5. Chromium VI is a subset of chromium compounds, which is accounted for separately as a HAP. As such, Chromium VI is only calculated as a TAP.

6. The WESP employs a caustic solution in its operation in which hydrochloric acid will have high water solubility. This caustic solution will neutralize the acid and effectively control it by 90%, per conversation on October 18, 2011 with Steven A. Jaasund, P.E. of Lundberg Associates, a manufacturer of WESPs.

   WESP HCl Control Efficiency 90.00%

7. Emission factors for natural gas combustion are from NCDAQ Natural Gas Combustion Spreadsheet and AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98. The emission factors for acetaldehyde, acrolein, and ammonia are cited in the NCDAQ spreadsheet as being sourced from the USEPA's WebFIRE database.

8. The RTO burners can fire either natural gas or propane; Propane is worst-case for these HAP emissions. Emission factors for propane combustion from the South Coast Air Quality Management District's Air Emissions Reporting Tool for external combustion equipment fired with LPG.

9. It was assumed that chlorine is not oxidized in the RTO.

10. Annual dried wood throughput is based on total facility production. Although dryer line 1 and dryer line 2 are capable of processing up to 537,625 ODT/yr and 620,000 ODT/yr, respectively, the combined throughput of both dryers will not exceed 781,255 ODT/yr. In order to to provide Enviva with the flexibility to use either dryer line up to its individual capacity, the total emissions from the two dryer lines are based on the total facility throughput and calculated as follows:
    - Where individual dryer emissions are calculated based on throughput (i.e. lb/ODT), the total emissions are estimated based on the total throughput of 781,255 ODT/yr.
    - Where individual dryer emissions are calculated based on fuel use (i.e. lb/MMBtu or lb/MMscf), the total emissions are conservatively set equal to the sum of the emissions from the two dryer lines assuming both dryer lines operate 8,760 hrs/yr.

Table 3c
Potential HAP and TAP Emissions
Dryer #1 (ES-DRYER-1, CD-WESP-1, CD-RTO-1)
Enviva Pellets Northampton, LLC

Abbreviations:

HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
ODT - oven dried tons
RTO - regenerative thermal oxidizer
TAP - toxic air pollutant
tpy - tons per year
VOC - volatile organic compound
WESP - wet electrostatic precipitator
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.
U.S. EPA. AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.
South Coast Air Quality Management District. AER Reporting tool. Emission factors available in the Help and Support Manual at: http://www.aqmd.gov/home/rules-compliance/compliance/annual-emission-reporting
U.S. EPA WebFIRE database available at: https://cfpub.epa.gov/webfire/

Table 3d
Potential PM Emissions from Baghouses/Cyclones
Enviva Pellets Northampton, LLC

Emission Unit ID [1]	Source Description	Control Device ID	Control Device Description	Exhaust Flow Rate[1]	Exit Grain Loading[2]	Annual Operation	Particulate Speciation		Potential Emissions[5]					
									PM		PM_{10}		$PM_{2.5}$	
				(cfm)	(gr/cf)	(hours)	PM_{10} (% of PM)	$PM_{2.5}$ (% of PM)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)
ES-HM-1 through 3	Dry Hammermills 1 through 3	CD-HM-BF-1	One (1) existing baghouse[3]	45,000	0.004	8,760	100%	40%	0.08	0.34	0.08	0.34	0.03	0.14
ES-HM-4 through 6	Dry Hammermills 4 through 6	CD-HM-BF-2	One (1) existing baghouse[3]	45,000	0.004	8,760	100%	40%	0.08	0.34	0.08	0.34	0.03	0.14
ES-HM-7 and 8 ES-DSHM-1 and -2	Dry Hammermills 7 through 8 Dry Shavings Hammermills 1 and 2	CD-HM-BF-3	One (1) existing baghouse[3]	45,000	0.004	8,760	100%	40%	0.08	0.34	0.08	0.34	0.03	0.14

Notes:

1. ES-HM-1 through 8, ES-DSHM-1 and 2, and the associated baghouses are not release points to the atmosphere. These calculations estimate the contribution of PM emissions from these units that will be emitted at CD-RTO-1.
2. Filter, Vent, and Cyclone inlet flow rate (cfm) provided by design engineering firm (Mid-South Engineering Co.). The exit flowrate was conservatively assumed to be the same as the inlet flowrate.
3. Pollutant loading provided by Aircon.
4. No speciation data is available for PM_{10}. Therefore, it is conservatively assumed to be equal to total PM. $PM_{2.5}$ speciation based on NCASI data for similar wood products sources.
5. Potential emissions assume a 95% control efficiency for Dryer Line #1 wet electrostatic precipitator (CD-WESP-1).

Abbreviations:

cf - cubic feet
cfm - cubic feet per minute
ES - Emission Sources
IES - Insignificant Emission Source
gr - grain
hr - hour
lb - pound
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
tpy - tons per year

Reference:

U.S. EPA. AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03

Table 3e
Potential Emissions
Dryer #1 Furnace Bypass (ES-FURNACEBYP-1) (Cold Start-up)[1]
Enviva Pellets Northampton, LLC

Calculation Basis

Hourly Heat Input Capacity	26.3 MMBtu/hr
Annual Heat Input Capacity	1,315 MMBtu/yr
Hours of Operation[1]	50 hr/yr

Potential Criteria Pollutant Emissions - Furnace Bypass (Cold Start-up)

Pollutant	Emission Factor	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	0.60	lb/MMBtu[2]	15.8	0.39
NO_X	0.22	lb/MMBtu[2]	5.78	0.14
SO_2	0.025	lb/MMBtu[2]	0.66	0.016
VOC	0.017	lb/MMBtu[2]	0.45	0.011
Total PM	0.58	lb/MMBtu[2]	15.2	0.38
Total PM_{10}	0.52	lb/MMBtu[2]	13.6	0.34
Total $PM_{2.5}$	0.45	lb/MMBtu[2]	11.8	0.29

Notes:

1. During cold start-ups, the furnace bypass stack is used until the refractory is sufficiently heated and can sustain operations at a low level (approximately 15% of the maximum heat input rate). The furnace bypass stack is then closed, and the furnace is slowly brought up to a normal operating rate. Diesel fuel may be used as an accelerant for cold start-up. The amount used per event is typically 15 – 30 gallons and the annual usage is typically 100 – 200 gallons and emissions resulting from diesel combustion are insignificant. In the event of a planned dryer shutdown, the dryer throughput and furnace heat input are decreased. Dryer raw material input ceases, and all remaining material is moved through the system to prevent a fire. On shutdown of the dryer, the furnace operating rate quickly approaches idle state. The furnace bypass stack is not utilized during a planned shutdown until after the furnace achieves an idle state (defined as 10 MMBtu/hr or less).

2. CO, NO_X, SO_2, PM, and VOC emission rates based on AP-42, Chapter 1.6 - Wood Residue Combustion in Boilers, 09/03 for bark/bark and wet wood/wet wood-fired boilers. VOC emission factor excludes formaldehyde.

Table 3e
Potential Emissions
Dryer #1 Furnace Bypass (ES-FURNACEBYP-1) (Cold Start-up)[1]
Enviva Pellets Northampton, LLC

Potential HAP Emissions - Furnace Bypass (Cold Start-up)

Pollutant	Emission Factor	Units	Footnote	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
Acetaldehyde	8.30E-04	lb/MMBtu	1	2.18E-02	5.46E-04
Acrolein	4.00E-03	lb/MMBtu	1	1.05E-01	2.63E-03
Formaldehyde	4.40E-03	lb/MMBtu	1	1.16E-01	2.89E-03
Phenol	5.10E-05	lb/MMBtu	1	1.34E-03	3.35E-05
Propionaldehyde	6.10E-05	lb/MMBtu	1	1.60E-03	4.01E-05
Acetophenone	3.2E-09	lb/MMBtu	1	8.41E-08	2.10E-09
Antimony and compounds	7.9E-06	lb/MMBtu	1	2.08E-04	5.19E-06
Arsenic	2.2E-05	lb/MMBtu	1	5.78E-04	1.45E-05
Benzo(a)pyrene	2.6E-06	lb/MMBtu	1	6.84E-05	1.71E-06
Beryllium	1.1E-06	lb/MMBtu	1	2.89E-05	7.23E-07
Cadmium	4.1E-06	lb/MMBtu	1	1.08E-04	2.70E-06
Carbon tetrachloride	4.5E-05	lb/MMBtu	1	1.18E-03	2.96E-05
Chlorine	7.9E-04	lb/MMBtu	1	2.08E-02	5.19E-04
Chlorobenzene	3.3E-05	lb/MMBtu	1	8.68E-04	2.17E-05
Chromium–Other compounds	2.1E-05	lb/MMBtu	1	5.52E-04	1.38E-05
Cobalt compounds	6.5E-06	lb/MMBtu	1	1.71E-04	4.27E-06
Dinitrophenol, 2,4-	1.8E-07	lb/MMBtu	1	4.73E-06	1.18E-07
Di(2-ethylhexyl)phthalate	4.7E-08	lb/MMBtu	1	1.24E-06	3.09E-08
Ethyl benzene	3.1E-05	lb/MMBtu	1	8.15E-04	2.04E-05
Dichloroethane, 1,2-	2.9E-05	lb/MMBtu	1	7.63E-04	1.91E-05
Hydrochloric acid	1.9E-02	lb/MMBtu	1	5.00E-01	1.25E-02
Lead	4.8E-05	lb/MMBtu	1	1.26E-03	3.16E-05
Manganese	1.6E-03	lb/MMBtu	1	4.21E-02	1.05E-03
Mercury	3.5E-06	lb/MMBtu	1	9.20E-05	2.30E-06
Methyl bromide	1.5E-05	lb/MMBtu	1	3.94E-04	9.86E-06
Methyl chloride	2.3E-05	lb/MMBtu	1	6.05E-04	1.51E-05
Trichloroethane, 1,1,1-	3.1E-05	lb/MMBtu	1	8.15E-04	2.04E-05
Naphthalene	9.7E-05	lb/MMBtu	1	2.55E-03	6.38E-05
Nickel	3.3E-05	lb/MMBtu	1	8.68E-04	2.17E-05
Nitrophenol, 4-	1.1E-07	lb/MMBtu	1	2.89E-06	7.23E-08
Pentachlorophenol	5.1E-08	lb/MMBtu	1	1.34E-06	3.35E-08
Perchloroethylene	3.8E-05	lb/MMBtu	1	9.99E-04	2.50E-05
Phosphorus metal, yellow or white	2.7E-05	lb/MMBtu	1	7.10E-04	1.77E-05
Polychlorinated biphenyls	8.2E-09	lb/MMBtu	1	2.14E-07	5.36E-09
Polycyclic Organic Matter	1.3E-04	lb/MMBtu	1	3.29E-03	8.22E-05
Dichloropropane, 1,2-	3.3E-05	lb/MMBtu	1	8.68E-04	2.17E-05
Selenium compounds	2.8E-06	lb/MMBtu	1	7.36E-05	1.84E-06
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	8.6E-12	lb/MMBtu	1	2.26E-10	5.65E-12
Trichloroethylene	3.0E-05	lb/MMBtu	1	7.89E-04	1.97E-05
Trichlorophenol, 2,4,6-	2.2E-08	lb/MMBtu	1	5.78E-07	1.45E-08
Vinyl chloride	1.8E-05	lb/MMBtu	1	4.73E-04	1.18E-05
Total HAP Emissions (Biomass Combustion)				**0.83**	**0.02**

Notes:

1. Emission factors for wood combustion in a stoker boiler from AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

Abbreviations:

CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
yr - year

Reference:

AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03

Table 3f
Potential Emissions
Dryer #1 Furnace Bypass (ES-FURNACEBYP-1) (Idle Mode)[1]
Enviva Pellets Northampton, LLC

Calculation Basis

Hourly Heat Input Capacity	10 MMBtu/hr
Annual Heat Input Capacity	5,000 MMBtu/yr
Hours of Operation[1]	500 hr/yr

Potential Criteria Pollutant and Greenhouse Gas Emissions per Dryer Line

Pollutant	Emission Factor	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	0.60	lb/MMBtu[2]	6.00	1.50
NO_X	0.22	lb/MMBtu[2]	2.20	0.55
SO_2	0.025	lb/MMBtu[2]	0.25	0.063
VOC	0.017	lb/MMBtu[2]	0.170	0.043
Total PM	0.58	lb/MMBtu[2]	5.77	1.44
Total PM_{10}	0.52	lb/MMBtu[2]	5.17	1.29
Total $PM_{2.5}$	0.45	lb/MMBtu[2]	4.47	1.12

Notes:

1. As part of this submittal Enviva is requesting a limit of 500 hours per year of "idle mode" for each furnace.
2. CO, NO_X, SO_2, PM, PM_{10}, $PM_{2.5}$, and VOC emission rates based on AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03 for bark/bark and wet wood/wet wood-fired boilers. PM_{10} and $PM_{2.5}$ factors equal to the sum of the filterable and condensible factors from Table 1.6-1. VOC emission factor excludes formaldehyde.

Table 3f
Potential Emissions
Dryer #1 Furnace Bypass (ES-FURNACEBYP-1) (Idle Mode)[1]
Enviva Pellets Northampton, LLC

Potential HAP Emissions per Dryer Line

Pollutant	Emission Factor	Units	Footnote	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
Acetaldehyde	8.30E-04	lb/MMBtu	1	8.30E-03	2.08E-03
Acrolein	4.00E-03	lb/MMBtu	1	4.00E-02	1.00E-02
Formaldehyde	4.40E-03	lb/MMBtu	1	4.40E-02	1.10E-02
Phenol	5.10E-05	lb/MMBtu	1	5.10E-04	1.28E-04
Propionaldehyde	6.10E-05	lb/MMBtu	1	6.10E-04	1.53E-04
Acetophenone	3.20E-09	lb/MMBtu	1	3.20E-08	8.00E-09
Antimony and compounds	7.90E-06	lb/MMBtu	1	7.90E-05	1.98E-05
Arsenic	2.20E-05	lb/MMBtu	1	2.20E-04	5.50E-05
Benzo(a)pyrene	2.60E-06	lb/MMBtu	1	2.60E-05	6.50E-06
Beryllium	1.10E-06	lb/MMBtu	1	1.10E-05	2.75E-06
Cadmium	4.10E-06	lb/MMBtu	1	4.10E-05	1.03E-05
Carbon tetrachloride	4.50E-05	lb/MMBtu	1	4.50E-04	1.13E-04
Chlorine	7.90E-04	lb/MMBtu	1	7.90E-03	1.98E-03
Chlorobenzene	3.30E-05	lb/MMBtu	1	3.30E-04	8.25E-05
Chromium–Other compounds	2.10E-05	lb/MMBtu	1	2.10E-04	5.25E-05
Cobalt compounds	6.50E-06	lb/MMBtu	1	6.50E-05	1.63E-05
Dinitrophenol, 2,4-	1.80E-07	lb/MMBtu	1	1.80E-06	4.50E-07
Bis(2-ethylhexyl)phthalate	4.70E-08	lb/MMBtu	1	4.70E-07	1.18E-07
Ethyl benzene	3.10E-05	lb/MMBtu	1	3.10E-04	7.75E-05
Dichloroethane, 1,2-	2.90E-05	lb/MMBtu	1	2.90E-04	7.25E-05
Hydrochloric acid	1.90E-02	lb/MMBtu	1	1.90E-01	4.75E-02
Lead	4.80E-05	lb/MMBtu	1	4.80E-04	1.20E-04
Manganese	1.60E-03	lb/MMBtu	1	1.60E-02	4.00E-03
Mercury	3.50E-06	lb/MMBtu	1	3.50E-05	8.75E-06
Methyl bromide	1.50E-05	lb/MMBtu	1	1.50E-04	3.75E-05
Methyl chloride	2.30E-05	lb/MMBtu	1	2.30E-04	5.75E-05
Trichloroethane, 1,1,1-	3.10E-05	lb/MMBtu	1	3.10E-04	7.75E-05
Naphthalene	9.70E-05	lb/MMBtu	1	9.70E-04	2.43E-04
Nickel	3.30E-05	lb/MMBtu	1	3.30E-04	8.25E-05
Nitrophenol, 4-	1.10E-07	lb/MMBtu	1	1.10E-06	2.75E-07
Pentachlorophenol	5.10E-08	lb/MMBtu	1	5.10E-07	1.28E-07
Perchloroethylene	3.80E-05	lb/MMBtu	1	3.80E-04	9.50E-05
Phosphorus metal, yellow or white	2.70E-05	lb/MMBtu	1	2.70E-04	6.75E-05
Polychlorinated biphenyls	8.15E-09	lb/MMBtu	1	8.15E-08	2.04E-08
Polycyclic Organic Matter	1.25E-04	lb/MMBtu	1	1.25E-03	3.13E-04
Dichloropropane, 1,2-	3.30E-05	lb/MMBtu	1	3.30E-04	8.25E-05
Selenium compounds	2.80E-06	lb/MMBtu	1	2.80E-05	7.00E-06
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	8.60E-12	lb/MMBtu	1	8.60E-11	2.15E-11
Trichloroethene	3.00E-05	lb/MMBtu	1	3.00E-04	7.50E-05
Trichlorophenol, 2,4,6-	2.20E-08	lb/MMBtu	1	2.20E-07	5.50E-08
Vinyl chloride	1.80E-05	lb/MMBtu	1	1.80E-04	4.50E-05
Total HAP Emissions (Biomass Combustion)				**0.31**	**0.079**

Notes:

1. Emission factors for wood combustion in a stoker boiler from AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

Abbreviations:

CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
yr - year

Reference:

AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03

Table 3g
Potential Emissions
Dryer #1 Double Duct Burners (IES-DDB-1 and -2)
Enviva Pellets Northampton, LLC

Duct Burner Inputs

Duct Burner Rating	2.5 MMBtu/hr
Number of Duct Burners	2
Annual Operation	8,760 hr/yr

Potential Criteria Pollutant Emissions - Natural Gas Combustion

Pollutant	Emission Factor	Units	Emission Factor Source	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
CO	84.0	lb/MMscf	Note 1	0.41	1.80
NO_X	50.0	lb/MMscf	Note 2	0.25	1.07
SO_2	0.60	lb/MMscf	Note 1	0.0029	0.013
VOC	5.50	lb/MMscf	Note 1	0.027	0.12
$PM/PM_{10}/PM_{2.5}$ Condensable	5.70	lb/MMscf	Note 1	0.028	0.12
$PM/PM_{10}/PM_{2.5}$ Filterable	1.90	lb/MMscf	Note 1	0.0093	0.041
Total $PM/PM_{10}/PM_{2.5}$				0.037	0.16

Potential Criteria Pollutant Emissions - Propane Combustion

Pollutant	Emission Factor[3]	Units	Emission Factor Source	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
CO	7.50	lb/Mgal	Note 3	0.41	1.80
NO_X	6.50	lb/Mgal	Note 4	0.36	1.56
SO_2	0.054	lb/Mgal	Note 3,5	0.0030	0.013
VOC	1.00	lb/Mgal	Note 3	0.055	0.24
$PM/PM_{10}/PM_{2.5}$ Condensable	0.50	lb/Mgal	Note 3	0.027	0.12
$PM/PM_{10}/PM_{2.5}$ Filterable	0.20	lb/Mgal	Note 3	0.011	0.048
Total $PM/PM_{10}/PM_{2.5}$				0.038	0.17

Notes:

1. Emission factors for natural gas combustion from AP-42 Section 1.4 - Natural Gas Combustion, 07/98. Natural gas heating value of 1,020 Btu/scf assumed per AP-42.
2. Emission factors for NO_X assume burners are low-NO_X burners, per email from Kai Simonsen (Enviva) on August 8, 2018.
3. Emission factors for propane combustion obtained from AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion, 07/08. Propane heating value of 91.5 MMBtu/Mgal assumed per AP-42.
4. AP-42 Section 1.5 does not include an emission factor for low-NO_X burners. Per AP-42 Section 1.4, low-NO_X burners reduce NO_X emissions by accomplishing combustion in stages, reducing NO_X emissions 40 to 85% relative to uncontrolled emission levels. A conservative control efficiency of 50% was applied to the uncontrolled NO_X emission factor from AP-42 Section 1.5. This reduction is consistent with the magnitude of reduction between the uncontrolled and low-NO_X emission factors in AP-
5. SO_2 emissions are based on an assumed fuel sulfur content of 0.54 grains/100 ft^3 per *A National Methodology and Emission Inventory for Residential Fuel Combustion* .

Table 3g
Potential Emissions
Dryer #1 Double Duct Burners (IES-DDB-1 and -2)
Enviva Pellets Northampton, LLC

Potential HAP and TAP Emissions

Pollutant	HAP	NC TAP	VOC	Emission Factor	Units	Footnote	Potential Emissions	
							Max (lb/hr)	Annual (tpy)
Duct Burners - Natural Gas/Propane Source								
2-Methylnaphthalene	Y	N	Y	2.4E-05	lb/MMscf	1	1.2E-07	5.2E-07
3-Methylchloranthrene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
7,12-Dimethylbenz(a)anthracene	Y	N	Y	1.6E-05	lb/MMscf	1	7.8E-08	3.4E-07
Acenaphthene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Acenaphthylene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Acetaldehyde	Y	Y	Y	1.5E-05	lb/MMscf	1	7.5E-08	3.3E-07
Acrolein	Y	Y	Y	1.8E-05	lb/MMscf	1	8.8E-08	3.9E-07
Ammonia	N	Y	N	3.2	lb/MMscf	1	1.6E-02	6.9E-02
Anthracene	Y	N	Y	2.4E-06	lb/MMscf	1	1.2E-08	5.2E-08
Arsenic	Y	Y	N	2.0E-04	lb/MMscf	1	9.8E-07	4.3E-06
Benz(a)anthracene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Benzene	Y	N	Y	7.1E-04	lb/MMBtu	2	3.6E-03	1.6E-02
Benzo(a)pyrene	Y	Y	Y	1.2E-06	lb/MMscf	1	5.9E-09	2.6E-08
Benzo(b)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Benzo(g,h,i)perylene	Y	N	Y	1.2E-06	lb/MMscf	1	5.9E-09	2.6E-08
Benzo(k)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Beryllium	Y	Y	N	1.2E-05	lb/MMscf	1	5.9E-08	2.6E-07
Cadmium	Y	Y	N	1.1E-03	lb/MMscf	1	5.4E-06	2.4E-05
Chromium VI	Y	N	N	1.4E-03	lb/MMscf	1	6.9E-06	3.0E-05
Chrysene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Cobalt	Y	N	N	8.4E-05	lb/MMscf	1	4.1E-07	1.8E-06
Dibenzo(a,h)anthracene	Y	N	Y	1.2E-06	lb/MMscf	1	5.9E-09	2.6E-08
Dichlorobenzene	Y	Y	Y	1.2E-03	lb/MMscf	1	5.9E-06	2.6E-05
Fluoranthene	Y	N	Y	3.0E-06	lb/MMscf	1	1.5E-08	6.4E-08
Fluorene	Y	N	Y	2.8E-06	lb/MMscf	1	1.4E-08	6.0E-08
Formaldehyde	Y	Y	Y	1.5E-03	lb/MMBtu	2	7.5E-03	3.3E-02
Hexane	Y	Y	Y	1.8	lb/MMscf	1	8.8E-03	3.9E-02
Indeno(1,2,3-cd)pyrene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Lead	Y	N	N	5.0E-04	lb/MMscf	1	2.5E-06	1.1E-05
Manganese	Y	Y	N	3.8E-04	lb/MMscf	1	1.9E-06	8.2E-06
Mercury	Y	Y	N	2.6E-04	lb/MMscf	1	1.3E-06	5.6E-06
Naphthalene	Y	N	Y	6.1E-04	lb/MMscf	1	3.0E-06	1.3E-05
Nickel	Y	Y	N	2.1E-03	lb/MMscf	1	1.0E-05	4.5E-05
Polycyclic Organic Matter	Y	N	N	4.0E-05	lb/MMBtu	2	2.0E-04	8.8E-04
Phenanthrene	Y	N	Y	1.7E-05	lb/MMscf	1	8.3E-08	3.7E-07
Pyrene	Y	N	Y	5.0E-06	lb/MMscf	1	2.5E-08	1.1E-07
Selenium compounds	Y	N	N	2.4E-05	lb/MMscf	1	1.2E-07	5.2E-07
Toluene	Y	Y	Y	3.4E-03	lb/MMscf	1	1.7E-05	7.3E-05
Total HAP Emissions (related to natural gas/propane)							**0.020**	**0.088**
Total TAP Emissions (related to natural gas/propane)							**0.032**	**0.14**

Notes:

1. Emission factors for natural gas combustion are from NCDAQ Natural Gas Combustion Spreadsheet and AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98. The emission factors for acetaldehyde, acrolein, and ammonia are cited in the NCDAQ spreadsheet as being sourced from the USEPA's WebFIRE database.
2. The duct burners can fire either natural gas or propane; Propane is worst-case for these HAP emissions. Emission factors for propane combustion from the South Coast Air Quality Management District's Air Emissions Reporting Tool for external combustion equipment fired with LPG.

Table 3g
Potential Emissions
Dryer #1 Double Duct Burners (IES-DDB-1 and -2)
Enviva Pellets Northampton, LLC

Abbreviations:

CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
LPG - liquified petroleum gas
Mgal - thousand gallons
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
RTO - regenerative thermal oxidizer
SO_2 - sulfur dioxide
TAP - toxic air pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.

U.S. EPA. AP-42, Section 1.5 - Liquefied Petroleum Gas Production, 07/08.

South Coast Air Quality Management District. AER Reporting tool. Emission factors available in the Help and Support Manual at: http://www.aqmd.gov/home/rules-compliance/compliance/annual-emission-reporting

U.S. EPA WebFIRE database available at: https://cfpub.epa.gov/webfire/

A National Methodology and Emission Inventory for Residential Fuel Combustion (2001). Retrieved from https://www3.epa.gov/ttnchie1/conference/ei12/area/haneke.pdf.

Table 4a
Potential Criteria Emissons
Dryer #2 (ES-DRYER-2, CD-WESP-2, CD-RTO-2)
Enviva Pellets Northampton, LLC

Calculation Basis

Annual Dried Wood Throughput[1]	781,255 ODT/year
Max. Hourly Dried Wood Throughput of Dryer	82.10 ODT/hr
Burner Heat Input	180.0 MMBtu/hr
Percent Hardwood	20.0%
Percent Softwood	80.0%
Annual Operation	8,760 hr/yr
Annual Heat Input	1,576,800 MMBtu/yr
Number of RTO Burners	4
RTO Burner Rating	6.2 MMBtu/hr
RTO Control Efficiency	97.50%

Potential Criteria Emissions

Pollutant	Biomass Emission Factor	Units	Emission Factor Source	Uncontrolled Emissions		Controlled Emissions	
				Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)
CO	0.4	lb/ODT	Note 2	--	--	32.84	156.3
NO_X	22.23	lb/hr	Note 2	--	--	22.23	97.4
$PM/PM_{10}/PM_{2.5}$ (Filterable + Condensable)	7.6	lb/hr	Note 4	--	--	7.60	33.3
SO_2	0.025	lb/MMBtu	AP-42, Section 1.6[3]	--	--	4.50	19.7
Total VOC (as propane)	2.640	lb/ODT	Note 5	216.74	1031.3	5.42	25.8

Notes:

[1] Annual dried wood throughput is based on total facility production. Although dryer line 1 and dryer line 2 are capable of processing up to 537,625 ODT/yr and 620,000 ODT/yr, respectively, the combined throughput of both dryers will not exceed 781,255 ODT/yr. In order to provide Enviva with the flexibility to use either dryer line up to its individual capacity, the total emissions from the two dryer lines are based on the total facility throughput and calculated as follows:
- Where individual dryer emissions are calculated based on throughput (i.e. lb/ODT), the total emissions are estimated based on the total throughput of 781,255 ODT/yr.
- Where individual dryer emissions are calculated based on fuel use (i.e. lb/MMBtu or lb/MMscf) or hourly test/vendor data (i.e., lb/hr), the total emissions are conservatively set equal to the sum of the emissions from the two dryer lines assuming both dryer lines operate 8,760 hr/yr.
- Dryer line 1 described as 175.3 MMBtu/hr = 155.3 MMBtu/hr from the grate and 2 additional 10 MMBtu/hr dust burners permitted but not added.

[2] Emissions based on process knowledge and/or information from NCASI database and includes appropriate contingency based on engineering judgement.

[3] No emission factor is provided in AP-42, Section 10.6.2 for SO_2 for rotary dryers. Enviva has conservatively calculated SO_2 emissions based upon the heat input of the furnace using an emission factor for wood combustion from AP-42, Section 1.6.

[4] Particulate emission factor is based on process knowledge and an appropriate contingency based on engineering judgement.

[5] VOC emission factor based on process knowledge and an appropriate contingency based on engineering judgement. Factor represents uncontrolled emissions.

Abbreviations:

hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
RTO - regenerative thermal oxidizer
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
WESP - wet electrostatic precipitator
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.
U.S. EPA. AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

Table 4b
Potential HAP and TAP Emissions
Dryer #2 (ES-DRYER-2, CD-WESP-2, CD-RTO-2)
Enviva Pellets Northampton, LLC

Calculation Basis

Annual Dried Wood Throughput[1]	781,255	ODT/year
Max. Hourly Dried Wood Throughput of Dryer	82.10	ODT/hr
Burner Heat Input	180.0	MMBtu/hr
Percent Hardwood	20.0%	
Percent Softwood	80.0%	
Annual Operation	8,760	hr/yr
Annual Heat Input	1,576,800	MMBtu/yr
Number of RTO Burners	4	
RTO Burner Rating	6.2	MMBtu/hr
RTO Control Efficiency	97.50%	

Potential HAP and TAP Emissions

Pollutant	HAP	NC TAP	VOC	Emission Factor	Units	Footnote	Potential Emissions	
							Max (lb/hr)	Annual (tpy)
Biomass Source								
Acetaldehyde	Y	Y	Y	1.7E-01	lb/ODT	2	0.35	1.64
Acrolein	Y	Y	Y	1.1E-01	lb/ODT	2	0.23	1.07
Formaldehyde	Y	Y	Y	1.4E-01	lb/ODT	2	0.29	1.40
Methanol	Y	N	Y	1.0E-01	lb/ODT	2	0.22	1.02
Phenol	Y	Y	Y	5.8E-02	lb/ODT	2	0.12	0.56
Propionaldehyde	Y	N	Y	3.9E-02	lb/ODT	2	0.08	0.38
Acetophenone	Y	N	Y	3.2E-09	lb/MMBtu	3,4	1.4E-08	6.3E-08
Antimony and compounds	Y	N	N	7.9E-06	lb/MMBtu	3,5	1.0E-04	4.5E-04
Arsenic	Y	Y	N	2.2E-05	lb/MMBtu	3,5	2.9E-04	1.3E-03
Benzene	Y	Y	Y	4.2E-03	lb/MMBtu	3,4	1.9E-02	8.3E-02
Benzo(a)pyrene	Y	Y	Y	2.6E-06	lb/MMBtu	3,4	1.2E-05	5.1E-05
Beryllium	Y	Y	N	1.1E-06	lb/MMBtu	3,5	1.4E-05	6.3E-05
Cadmium	Y	Y	N	4.1E-06	lb/MMBtu	3,5	5.4E-05	2.3E-04
Carbon tetrachloride	Y	Y	Y	4.5E-05	lb/MMBtu	3,4	2.0E-04	8.9E-04
Chlorine	Y	Y	N	7.9E-04	lb/MMBtu	3,10	1.4E-01	6.2E-01
Chlorobenzene	Y	Y	Y	3.3E-05	lb/MMBtu	3,4	1.5E-04	6.5E-04
Chloroform	Y	Y	Y	2.8E-05	lb/MMBtu	3,4	1.3E-04	5.5E-04
Chromium VI	-[5]	Y	N	3.5E-06	lb/MMBtu	3,5,6	4.6E-05	2.0E-04
Chromium–Other compounds	Y	N	N	1.8E-05	lb/MMBtu	3,5	2.3E-04	1.0E-03
Cobalt compounds	Y	N	N	6.5E-06	lb/MMBtu	3,5	8.5E-05	3.7E-04
Dichloroethane, 1,2-	Y	Y	Y	2.9E-05	lb/MMBtu	3,4	1.3E-04	5.7E-04
Dichloropropane, 1,2-	Y	N	Y	3.3E-05	lb/MMBtu	3,4	1.5E-04	6.5E-04
Dinitrophenol, 2,4-	Y	N	Y	1.8E-07	lb/MMBtu	3,4	8.1E-07	3.5E-06
Di(2-ethylhexyl)phthalate	Y	Y	Y	4.7E-08	lb/MMBtu	3,4	2.1E-07	9.3E-07
Ethyl benzene	Y	N	Y	3.1E-05	lb/MMBtu	3,4	1.4E-04	6.1E-04
Hexachlorodibenzo-p-dioxin, 1,2,3,6,7,8-	N	Y	Y	1.8E-11	lb/MMBtu	3,4	8.1E-11	3.5E-10
Hydrochloric acid	Y	Y	N	1.9E-02	lb/MMBtu	3,7	3.4E-01	1.5E+00
Lead	Y	N	N	4.8E-05	lb/MMBtu	3,5	6.3E-04	2.7E-03
Manganese	Y	Y	N	1.6E-03	lb/MMBtu	3,5	2.1E-02	9.1E-02
Mercury	Y	Y	N	3.5E-06	lb/MMBtu	3,5	4.6E-05	2.0E-04
Methyl bromide	Y	N	Y	1.5E-05	lb/MMBtu	3,4	6.8E-05	3.0E-04
Methyl chloride	Y	N	Y	2.3E-05	lb/MMBtu	3,4	1.0E-04	4.5E-04
Methyl ethyl ketone	N	Y	Y	5.4E-06	lb/MMBtu	3,4	2.4E-05	1.1E-04
Methylene chloride	Y	Y	Y	2.9E-04	lb/MMBtu	3,4	1.3E-03	5.7E-03
Naphthalene	Y	N	Y	9.7E-05	lb/MMBtu	3,4	4.4E-04	1.9E-03
Nickel	Y	Y	N	3.3E-05	lb/MMBtu	3,5	4.3E-04	1.9E-03
Nitrophenol, 4-	Y	N	Y	1.1E-07	lb/MMBtu	3,4	5.0E-07	2.2E-06
Pentachlorophenol	Y	Y	N	5.1E-08	lb/MMBtu	3	2.3E-07	1.0E-06
Perchloroethylene	Y	Y	N	3.8E-05	lb/MMBtu	3	1.7E-04	7.5E-04
Phosphorus metal, yellow or white	Y	N	N	2.7E-05	lb/MMBtu	3,5	3.5E-04	1.5E-03
Polychlorinated biphenyls	Y	Y	Y	8.2E-09	lb/MMBtu	3,4	3.7E-08	1.6E-07
Polycyclic Organic Matter	Y	N	N	1.3E-04	lb/MMBtu	3	5.6E-04	2.5E-03
Selenium compounds	Y	N	N	2.8E-06	lb/MMBtu	3,5	3.7E-05	1.6E-04
Styrene	Y	Y	Y	1.9E-03	lb/MMBtu	3,4	8.6E-03	3.7E-02
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	Y	Y	Y	8.6E-12	lb/MMBtu	3,4	3.9E-11	1.7E-10
Toluene	Y	Y	Y	3.0E-05	lb/MMBtu	3,4	1.4E-04	5.9E-04
Trichloroethane, 1,1,1-	Y	Y	N	3.1E-05	lb/MMBtu	3	1.4E-04	6.1E-04
Trichloroethylene	Y	Y	Y	3.0E-05	lb/MMBtu	3,4	1.4E-04	5.9E-04
Trichlorofluoromethane	N	Y	Y	4.1E-05	lb/MMBtu	3,4	1.8E-04	8.1E-04
Trichlorophenol, 2,4,6-	Y	N	Y	2.2E-08	lb/MMBtu	3,4	9.9E-08	4.3E-07
Vinyl chloride	Y	Y	Y	1.8E-05	lb/MMBtu	3,4	8.1E-05	3.5E-04
Xylene	Y	Y	Y	2.5E-05	lb/MMBtu	3,4	1.1E-04	4.9E-04
					Total HAP Emissions (related to biomass)		**1.82**	**8.44**
					Total TAP Emissions (related to biomass)		**1.52**	**7.03**

Table 4b
Potential HAP and TAP Emissions
Dryer #2 (ES-DRYER-2, CD-WESP-2, CD-RTO-2)
Enviva Pellets Northampton, LLC

Pollutant	HAP	NC TAP	VOC	Emission Factor	Units	Footnote	Potential Emissions	
							Max (lb/hr)	Annual (tpy)
RTO - Natural Gas/Propane Source								
2-Methylnaphthalene	Y	N	Y	2.4E-05	lb/MMscf	8	5.8E-07	2.6E-06
3-Methylchloranthrene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
7,12-Dimethylbenz(a)anthracene	Y	N	Y	1.6E-05	lb/MMscf	8	3.9E-07	1.7E-06
Acenaphthene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
Acenaphthylene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
Acetaldehyde	Y	Y	Y	1.5E-05	lb/MMscf	8	3.7E-07	1.6E-06
Acrolein	Y	Y	Y	1.8E-05	lb/MMscf	8	4.4E-07	1.9E-06
Ammonia	N	Y	N	3.2	lb/MMscf	8	7.8E-02	3.4E-01
Anthracene	Y	N	Y	2.4E-06	lb/MMscf	8	5.8E-08	2.6E-07
Arsenic	Y	Y	N	2.0E-04	lb/MMscf	8	4.9E-06	2.1E-05
Benz(a)anthracene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
Benzene	Y	N	Y	7.1E-04	lb/MMBtu	9	1.8E-02	7.7E-02
Benzo(a)pyrene	Y	Y	Y	1.2E-06	lb/MMscf	8	2.9E-08	1.3E-07
Benzo(b)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
Benzo(g,h,i)perylene	Y	N	Y	1.2E-06	lb/MMscf	8	2.9E-08	1.3E-07
Benzo(k)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
Beryllium	Y	Y	N	1.2E-05	lb/MMscf	8	2.9E-07	1.3E-06
Cadmium	Y	Y	N	1.1E-03	lb/MMscf	8	2.7E-05	1.2E-04
Chromium VI	Y	N	N	1.4E-03	lb/MMscf	8	3.4E-05	1.5E-04
Chrysene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
Cobalt	Y	N	N	8.4E-05	lb/MMscf	8	2.0E-06	8.9E-06
Dibenzo(a,h)anthracene	Y	N	Y	1.2E-06	lb/MMscf	8	2.9E-08	1.3E-07
Dichlorobenzene	Y	Y	Y	1.2E-03	lb/MMscf	8	2.9E-05	1.3E-04
Fluoranthene	Y	N	Y	3.0E-06	lb/MMscf	8	7.3E-08	3.2E-07
Fluorene	Y	N	Y	2.8E-06	lb/MMscf	8	6.8E-08	3.0E-07
Formaldehyde	Y	Y	Y	1.5E-03	lb/MMBtu	9	3.7E-02	1.6E-01
Hexane	Y	Y	Y	1.8	lb/MMscf	8	4.4E-02	1.9E-01
Indeno(1,2,3-cd)pyrene	Y	N	Y	1.8E-06	lb/MMscf	8	4.4E-08	1.9E-07
Lead	Y	N	N	5.0E-04	lb/MMscf	8	1.2E-05	5.3E-05
Manganese	Y	Y	N	3.8E-04	lb/MMscf	8	9.2E-06	4.0E-05
Mercury	Y	Y	N	2.6E-04	lb/MMscf	8	6.3E-06	2.8E-05
Naphthalene	Y	N	Y	6.1E-04	lb/MMscf	8	1.5E-05	6.5E-05
Nickel	Y	Y	N	2.1E-03	lb/MMscf	8	5.1E-05	2.2E-04
Polycyclic Organic Matter	Y	N	N	4.0E-05	lb/MMBtu	9	9.9E-04	4.3E-03
Phenanthrene	Y	N	Y	1.7E-05	lb/MMscf	8	4.1E-07	1.8E-06
Pyrene	Y	N	Y	5.0E-06	lb/MMscf	8	1.2E-07	5.3E-07
Selenium compounds	Y	N	N	2.4E-05	lb/MMscf	8	5.8E-07	2.6E-06
Toluene	Y	Y	Y	3.4E-03	lb/MMscf	8	8.3E-05	3.6E-04
Total HAP Emissions (related to natural gas/propane)							**0.10**	**0.44**
Total TAP Emissions (related to natural gas/propane)							**0.16**	**0.36**

Notes:

1. Annual dried wood throughput is based on total facility production. Although dryer line 1 and dryer line 2 are capable of processing up to 537,625 ODT/yr and 620,000 ODT/yr, respectively, the combined throughput of both dryers will not exceed 781,255 ODT/yr. In order to provide Enviva with the flexibility to use either dryer line up to its individual capacity, the total emissions from the two dryer lines are based on the total facility throughput and calculated as follows:
   - Where individual dryer emissions are calculated based on throughput (i.e. lb/ODT), the total emissions are estimated based on the total throughput of 781,255 ODT/yr.
   - Where individual dryer emissions are calculated based on fuel use (i.e. lb/MMBtu or lb/MMscf), the total emissions are conservatively set equal to the sum of the emissions from the two dryer lines assuming both dryer lines operate 8,760 hrs/yr.
2. Emission factor based on process knowledge and an appropriate contingency based on engineering judgement. The emission factors represent uncontrolled emissions.
3. Emission factors (criteria and HAP/TAP) for wood combustion in a stoker boiler from NCDAQ Wood Waste Combustion Spreadsheet/AP-42, Fifth Edition, Volume 1, Chapter 1.6 - Wood Residue Combustion in Boilers, 09/03.
4. The control efficiency of 97.5% for the RTO is applied to all VOC hazardous and toxic pollutants.
   The control efficiency of the wet electrostatic precipitator (WESP) for filterable particulate matter is applied to all metal hazardous and toxic pollutants from the dryer and duct burners. Actual design filterable efficiency is estimated to 96.4%, but 92.75% is assumed for toxics permitting.
5. WESP Control Efficiency for metal HAP 92.8%
6. Chromium VI is a subset of chromium compounds, which is accounted for separately as a HAP. As such, Chromium VI is only calculated as a TAP.
   The WESP employs a caustic solution in its operation in which hydrochloric acid will have high water solubility. This caustic solution will neutralize the acid and effectively control it by 90%, per conversation on October 18, 2011 with Steven A. Jaasund, P.E. of Lundberg Associates, a manufacturer of WESPs.
7. WESP HCl Control Efficiency 90.00%
8. Emission factors for natural gas combustion are from NCDAQ Natural Gas Combustion Spreadsheet and AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98. The emission factors for acetaldehyde, acrolein, and ammonia are cited in the NCDAQ spreadsheet as being sourced from the USEPA's WebFIRE database.
9. The RTO burners can fire either natural gas or propane; Propane is worst-case for these HAP emissions. Emission factors for propane combustion from the South Coast Air Quality Management District's Air Emissions Reporting Tool for external combustion equipment fired with LPG.
10. It was assumed that chlorine is not oxidized in the RTO.

Table 4b
Potential HAP and TAP Emissions
Dryer #2 (ES-DRYER-2, CD-WESP-2, CD-RTO-2)
Enviva Pellets Northampton, LLC

Abbreviations:

HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
ODT - oven dried tons
RTO - regenerative thermal oxidizer
TAP - toxic air pollutant
tpy - tons per year
VOC - volatile organic compound
WESP - wet electrostatic precipitator
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.
U.S. EPA. AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.
South Coast Air Quality Management District. AER Reporting tool. Emission factors available in the Help and Support Manual at: http://www.aqmd.gov/home/rules-compliance/compliance/annual-emission-reporting
U.S. EPA WebFIRE database available at: https://cfpub.epa.gov/webfire/

Table 4c
Potential Emissions
Dryer #2 Furnace Bypass (ES-FURNACEBYP-2) (Cold Start-up)[1]
Enviva Pellets Northampton, LLC

Calculation Basis

Hourly Heat Input Capacity	27 MMBtu/hr
Annual Heat Input Capacity	1,350 MMBtu/yr
Hours of Operation[1]	50 hr/yr

Potential Criteria Pollutant Emissions - Furnace Bypass (Cold Start-up)

Pollutant	Emission Factor	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	0.60	lb/MMBtu[2]	16.2	0.41
NO_X	0.22	lb/MMBtu[2]	5.94	0.15
SO_2	0.025	lb/MMBtu[2]	0.68	0.017
VOC	0.017	lb/MMBtu[2]	0.46	0.011
Total PM	0.58	lb/MMBtu[2]	15.6	0.39
Total PM_{10}	0.52	lb/MMBtu[2]	14.0	0.35
Total $PM_{2.5}$	0.45	lb/MMBtu[2]	12.1	0.30

Notes:

1. During cold start-ups, the furnace bypass stack is used until the refractory is sufficiently heated and can sustain operations at a low level (approximately 15% of the maximum heat input rate). The furnace bypass stack is then closed, and the furnace is slowly brought up to a normal operating rate. Diesel fuel may be used as an accelerant for cold start-up. The amount used per event is typically 15 – 30 gallons and the annual usage is typically 100 – 200 gallons and emissions resulting from diesel combustion are insignificant. In the event of a planned dryer shutdown, the dryer throughput and furnace heat input are decreased. Dryer raw material input ceases, and all remaining material is moved through the system to prevent a fire. On shutdown of the dryer, the furnace operating rate quickly approaches idle state. The furnace bypass stack is not utilized during a planned shutdown until after the furnace achieves an idle state (defined as 10 MMBtu/hr or less).

2. CO, NO_X, SO_2, PM, and VOC emission rates based on AP-42, Chapter 1.6 - Wood Residue Combustion in Boilers, 09/03 for bark/bark and wet wood/wet wood-fired boilers. VOC emission factor excludes formaldehyde.

Table 4c
Potential Emissions
Dryer #2 Furnace Bypass (ES-FURNACEBYP-2) (Cold Start-up)[1]
Enviva Pellets Northampton, LLC

Potential HAP Emissions - Furnace Bypass (Cold Start-up)

Pollutant	Emission Factor	Units	Footnote	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
Acetaldehyde	8.30E-04	lb/MMBtu	1	2.24E-02	5.60E-04
Acrolein	4.00E-03	lb/MMBtu	1	1.08E-01	2.70E-03
Formaldehyde	4.40E-03	lb/MMBtu	1	1.19E-01	2.97E-03
Phenol	5.10E-05	lb/MMBtu	1	1.38E-03	3.44E-05
Propionaldehyde	6.10E-05	lb/MMBtu	1	1.65E-03	4.12E-05
Acetophenone	3.2E-09	lb/MMBtu	1	8.64E-08	2.16E-09
Antimony and compounds	7.9E-06	lb/MMBtu	1	2.13E-04	5.33E-06
Arsenic	2.2E-05	lb/MMBtu	1	5.94E-04	1.49E-05
Benzo(a)pyrene	2.6E-06	lb/MMBtu	1	7.02E-05	1.76E-06
Beryllium	1.1E-06	lb/MMBtu	1	2.97E-05	7.43E-07
Cadmium	4.1E-06	lb/MMBtu	1	1.11E-04	2.77E-06
Carbon tetrachloride	4.5E-05	lb/MMBtu	1	1.22E-03	3.04E-05
Chlorine	7.9E-04	lb/MMBtu	1	2.13E-02	5.33E-04
Chlorobenzene	3.3E-05	lb/MMBtu	1	8.91E-04	2.23E-05
Chromium–Other compounds	2.1E-05	lb/MMBtu	1	5.67E-04	1.42E-05
Cobalt compounds	6.5E-06	lb/MMBtu	1	1.76E-04	4.39E-06
Dinitrophenol, 2,4-	1.8E-07	lb/MMBtu	1	4.86E-06	1.22E-07
Di(2-ethylhexyl)phthalate	4.7E-08	lb/MMBtu	1	1.27E-06	3.17E-08
Ethyl benzene	3.1E-05	lb/MMBtu	1	8.37E-04	2.09E-05
Dichloroethane, 1,2-	2.9E-05	lb/MMBtu	1	7.83E-04	1.96E-05
Hydrochloric acid	1.9E-02	lb/MMBtu	1	5.13E-01	1.28E-02
Lead	4.8E-05	lb/MMBtu	1	1.30E-03	3.24E-05
Manganese	1.6E-03	lb/MMBtu	1	4.32E-02	1.08E-03
Mercury	3.5E-06	lb/MMBtu	1	9.45E-05	2.36E-06
Methyl bromide	1.5E-05	lb/MMBtu	1	4.05E-04	1.01E-05
Methyl chloride	2.3E-05	lb/MMBtu	1	6.21E-04	1.55E-05
Trichloroethane, 1,1,1-	3.1E-05	lb/MMBtu	1	8.37E-04	2.09E-05
Naphthalene	9.7E-05	lb/MMBtu	1	2.62E-03	6.55E-05
Nickel	3.3E-05	lb/MMBtu	1	8.91E-04	2.23E-05
Nitrophenol, 4-	1.1E-07	lb/MMBtu	1	2.97E-06	7.43E-08
Pentachlorophenol	5.1E-08	lb/MMBtu	1	1.38E-06	3.44E-08
Perchloroethylene	3.8E-05	lb/MMBtu	1	1.03E-03	2.57E-05
Phosphorus metal, yellow or white	2.7E-05	lb/MMBtu	1	7.29E-04	1.82E-05
Polychlorinated biphenyls	8.2E-09	lb/MMBtu	1	2.20E-07	5.50E-09
Polycyclic Organic Matter	1.3E-04	lb/MMBtu	1	3.38E-03	8.44E-05
Dichloropropane, 1,2-	3.3E-05	lb/MMBtu	1	8.91E-04	2.23E-05
Selenium compounds	2.8E-06	lb/MMBtu	1	7.56E-05	1.89E-06
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	8.6E-12	lb/MMBtu	1	2.32E-10	5.81E-12
Trichloroethylene	3.0E-05	lb/MMBtu	1	8.10E-04	2.03E-05
Trichlorophenol, 2,4,6-	2.2E-08	lb/MMBtu	1	5.94E-07	1.49E-08
Vinyl chloride	1.8E-05	lb/MMBtu	1	4.86E-04	1.22E-05
Total HAP Emissions (Biomass Combustion)				**0.85**	**0.02**

Notes:

[1.] Emission factors for wood combustion in a stoker boiler from AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

Abbreviations:

CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
yr - year

Reference:

AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03

Table 4d
Potential Emissions
Dryer #2 Furnace Bypass (ES-FURNACEBYP-2) (Idle Mode)[1]
Enviva Pellets Northampton, LLC

Calculation Basis

Hourly Heat Input Capacity	10	MMBtu/hr
Annual Heat Input Capacity	5,000	MMBtu/yr
Hours of Operation[1]	500	hr/yr

Potential Criteria Pollutant and Greenhouse Gas Emissions per Dryer Line

Pollutant	Emission Factor	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	0.60	lb/MMBtu[2]	6.00	1.50
NO_X	0.22	lb/MMBtu[2]	2.20	0.55
SO_2	0.025	lb/MMBtu[2]	0.25	0.063
VOC	0.017	lb/MMBtu[2]	0.170	0.043
Total PM	0.58	lb/MMBtu[2]	5.77	1.44
Total PM_{10}	0.52	lb/MMBtu[2]	5.17	1.29
Total $PM_{2.5}$	0.45	lb/MMBtu[2]	4.47	1.12

Notes:

1. As part of this submittal Enviva is requesting a limit of 500 hours per year of "idle mode" for each furnace.
2. CO, NO_X, SO_2, PM, PM_{10}, $PM_{2.5}$, and VOC emission rates based on AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03 for bark/bark and wet wood/wet wood-fired boilers. PM_{10} and $PM_{2.5}$ factors equal to the sum of the filterable and condensible factors from Table 1.6-1. VOC emission factor excludes formaldehyde.

Table 4d
Potential Emissions
Dryer #2 Furnace Bypass (ES-FURNACEBYP-2) (Idle Mode)[1]
Enviva Pellets Northampton, LLC

Potential HAP Emissions per Dryer Line

Pollutant	Emission Factor	Units	Footnote	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
Acetaldehyde	8.30E-04	lb/MMBtu	1	8.30E-03	2.08E-03
Acrolein	4.00E-03	lb/MMBtu	1	4.00E-02	1.00E-02
Formaldehyde	4.40E-03	lb/MMBtu	1	4.40E-02	1.10E-02
Phenol	5.10E-05	lb/MMBtu	1	5.10E-04	1.28E-04
Propionaldehyde	6.10E-05	lb/MMBtu	1	6.10E-04	1.53E-04
Acetophenone	3.2E-09	lb/MMBtu	1	3.20E-08	8.00E-09
Antimony and compounds	7.9E-06	lb/MMBtu	1	7.90E-05	1.98E-05
Arsenic	2.2E-05	lb/MMBtu	1	2.20E-04	5.50E-05
Benzo(a)pyrene	2.6E-06	lb/MMBtu	1	2.60E-05	6.50E-06
Beryllium	1.1E-06	lb/MMBtu	1	1.10E-05	2.75E-06
Cadmium	4.1E-06	lb/MMBtu	1	4.10E-05	1.03E-05
Carbon tetrachloride	4.5E-05	lb/MMBtu	1	4.50E-04	1.13E-04
Chlorine	7.9E-04	lb/MMBtu	1	7.90E-03	1.98E-03
Chlorobenzene	3.3E-05	lb/MMBtu	1	3.30E-04	8.25E-05
Chromium–Other compounds	2.1E-05	lb/MMBtu	1	2.10E-04	5.25E-05
Cobalt compounds	6.5E-06	lb/MMBtu	1	6.50E-05	1.63E-05
Dinitrophenol, 2,4-	1.8E-07	lb/MMBtu	1	1.80E-06	4.50E-07
Bis(2-ethylhexyl)phthalate	4.7E-08	lb/MMBtu	1	4.70E-07	1.18E-07
Ethyl benzene	3.1E-05	lb/MMBtu	1	3.10E-04	7.75E-05
Dichloroethane, 1,2-	2.9E-05	lb/MMBtu	1	2.90E-04	7.25E-05
Hydrochloric acid	1.9E-02	lb/MMBtu	1	1.90E-01	4.75E-02
Lead	4.8E-05	lb/MMBtu	1	4.80E-04	1.20E-04
Manganese	1.6E-03	lb/MMBtu	1	1.60E-02	4.00E-03
Mercury	3.5E-06	lb/MMBtu	1	3.50E-05	8.75E-06
Methyl bromide	1.5E-05	lb/MMBtu	1	1.50E-04	3.75E-05
Methyl chloride	2.3E-05	lb/MMBtu	1	2.30E-04	5.75E-05
Trichloroethane, 1,1,1-	3.1E-05	lb/MMBtu	1	3.10E-04	7.75E-05
Naphthalene	9.7E-05	lb/MMBtu	1	9.70E-04	2.43E-04
Nickel	3.3E-05	lb/MMBtu	1	3.30E-04	8.25E-05
Nitrophenol, 4-	1.1E-07	lb/MMBtu	1	1.10E-06	2.75E-07
Pentachlorophenol	5.1E-08	lb/MMBtu	1	5.10E-07	1.28E-07
Perchloroethylene	3.8E-05	lb/MMBtu	1	3.80E-04	9.50E-05
Phosphorus metal, yellow or white	2.7E-05	lb/MMBtu	1	2.70E-04	6.75E-05
Polychlorinated biphenyls	8.2E-09	lb/MMBtu	1	8.15E-08	2.04E-08
Polycyclic Organic Matter	1.3E-04	lb/MMBtu	1	1.25E-03	3.13E-04
Dichloropropane, 1,2-	3.3E-05	lb/MMBtu	1	3.30E-04	8.25E-05
Selenium compounds	2.8E-06	lb/MMBtu	1	2.80E-05	7.00E-06
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	8.6E-12	lb/MMBtu	1	8.60E-11	2.15E-11
Trichloroethene	3.0E-05	lb/MMBtu	1	3.00E-04	7.50E-05
Trichlorophenol, 2,4,6-	2.2E-08	lb/MMBtu	1	2.20E-07	5.50E-08
Vinyl chloride	1.8E-05	lb/MMBtu	1	1.80E-04	4.50E-05
Total HAP Emissions (Biomass Combustion)				**0.31**	**0.079**

Notes:

[1.] Emission factors for wood combustion in a stoker boiler from AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

Abbreviations:

CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
yr - year

Reference:

AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03

Table 4e
Potential Emissions
Dryer #2 Double Duct Burners (IES-DDB-3 and -4)
Enviva Pellets Northampton, LLC

Duct Burner Inputs

Duct Burner Rating	2.5 MMBtu/hr
Number of Duct Burners	2
Annual Operation	8,760 hr/yr

Potential Criteria Pollutant Emissions:

Potential Criteria Pollutant Emissions - Natural Gas Combustion

Pollutant	Emission Factor	Units	Emission Factor Source	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
CO	84.0	lb/MMscf	Note 1	0.41	1.80
NO_X	50.0	lb/MMscf	Note 2	0.25	1.07
SO_2	0.60	lb/MMscf	Note 1	0.0029	0.013
VOC	5.50	lb/MMscf	Note 1	0.027	0.12
$PM/PM_{10}/PM_{2.5}$ Condensable	5.70	lb/MMscf	Note 1	0.028	0.12
$PM/PM_{10}/PM_{2.5}$ Filterable	1.90	lb/MMscf	Note 1	0.0093	0.041
Total $PM/PM_{10}/PM_{2.5}$				0.037	0.16

Potential Criteria Pollutant Emissions - Propane Combustion

Pollutant	Emission Factor	Units	Emission Factor Source	Potential Emissions	
				Max (lb/hr)	Annual (tpy)
CO	7.50	lb/Mgal	Note 3	0.41	1.80
NO_X	6.50	lb/Mgal	Note 4	0.36	1.56
SO_2	0.054	lb/Mgal	Note 3,5	0.0030	0.013
VOC	1.00	lb/Mgal	Note 3	0.055	0.24
$PM/PM_{10}/PM_{2.5}$ Condensable	0.50	lb/Mgal	Note 3	0.027	0.12
$PM/PM_{10}/PM_{2.5}$ Filterable	0.20	lb/Mgal	Note 3	0.011	0.048
Total $PM/PM_{10}/PM_{2.5}$				0.038	0.17

Notes:

1. Emission factors for natural gas combustion from AP-42 Section 1.4 - Natural Gas Combustion, 07/98. Natural gas heating value of 1,020 Btu/scf assumed per AP-42.
2. Emission factors for NO_X assume burners are low-NO_X burners, per email from Kai Simonsen (Enviva) on August 8, 2018.
3. Emission factors for propane combustion obtained from AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion, 07/08. Propane heating value of 91.5 MMBtu/Mgal assumed per AP-42.
4. AP-42 Section 1.5 does not include an emission factor for low-NO_X burners. Per AP-42 Section 1.4, low-NO_X burners reduce NO_X emissions by accomplishing combustion in stages, reducing NO_X emissions 40 to 85% relative to uncontrolled emission levels. A conservative control efficiency of 50% was applied to the uncontrolled NO_X emission factor from AP-42 Section 1.5. This reduction is consistent with the magnitude of reduction between the uncontrolled and low-NO_X emission factors in
5. SO_2 emissions are based on an assumed fuel sulfur content of 0.54 grains/100 ft^3 per *A National Methodology and Emission Inventory for Residential Fuel Combustion* .

Table 4e
Potential Emissions
Dryer #2 Double Duct Burners (IES-DDB-3 and -4)
Enviva Pellets Northampton, LLC

Potential HAP and TAP Emissions

Pollutant	HAP	NC TAP	VOC	Emission Factor	Units	Footnote	Potential Emissions	
							Max (lb/hr)	Annual (tpy)
Duct Burners - Natural Gas/Propane Source								
2-Methylnaphthalene	Y	N	Y	2.4E-05	lb/MMscf	1	1.2E-07	5.2E-07
3-Methylchloranthrene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
7,12-Dimethylbenz(a)anthracene	Y	N	Y	1.6E-05	lb/MMscf	1	7.8E-08	3.4E-07
Acenaphthene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Acenaphthylene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Acetaldehyde	Y	Y	Y	1.5E-05	lb/MMscf	1	7.5E-08	3.3E-07
Acrolein	Y	Y	Y	1.8E-05	lb/MMscf	1	8.8E-08	3.9E-07
Ammonia	N	Y	N	3.2	lb/MMscf	1	1.6E-02	6.9E-02
Anthracene	Y	N	Y	2.4E-06	lb/MMscf	1	1.2E-08	5.2E-08
Arsenic	Y	Y	N	2.0E-04	lb/MMscf	1	9.8E-07	4.3E-06
Benz(a)anthracene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Benzene	Y	N	Y	7.1E-04	lb/MMBtu	2	3.6E-03	1.6E-02
Benzo(a)pyrene	Y	Y	Y	1.2E-06	lb/MMscf	1	5.9E-09	2.6E-08
Benzo(b)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Benzo(g,h,i)perylene	Y	N	Y	1.2E-06	lb/MMscf	1	5.9E-09	2.6E-08
Benzo(k)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Beryllium	Y	Y	N	1.2E-05	lb/MMscf	1	5.9E-08	2.6E-07
Cadmium	Y	Y	N	1.1E-03	lb/MMscf	1	5.4E-06	2.4E-05
Chromium VI	Y	N	N	1.4E-03	lb/MMscf	1	6.9E-06	3.0E-05
Chrysene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Cobalt	Y	N	N	8.4E-05	lb/MMscf	1	4.1E-07	1.8E-06
Dibenzo(a,h)anthracene	Y	N	Y	1.2E-06	lb/MMscf	1	5.9E-09	2.6E-08
Dichlorobenzene	Y	Y	Y	1.2E-03	lb/MMscf	1	5.9E-06	2.6E-05
Fluoranthene	Y	N	Y	3.0E-06	lb/MMscf	1	1.5E-08	6.4E-08
Fluorene	Y	N	Y	2.8E-06	lb/MMscf	1	1.4E-08	6.0E-08
Formaldehyde	Y	Y	Y	1.5E-03	lb/MMBtu	2	7.5E-03	3.3E-02
Hexane	Y	Y	Y	1.8	lb/MMscf	1	8.8E-03	3.9E-02
Indeno(1,2,3-cd)pyrene	Y	N	Y	1.8E-06	lb/MMscf	1	8.8E-09	3.9E-08
Lead	Y	N	N	5.0E-04	lb/MMscf	1	2.5E-06	1.1E-05
Manganese	Y	Y	N	3.8E-04	lb/MMscf	1	1.9E-06	8.2E-06
Mercury	Y	Y	N	2.6E-04	lb/MMscf	1	1.3E-06	5.6E-06
Naphthalene	Y	N	Y	6.1E-04	lb/MMscf	1	3.0E-06	1.3E-05
Nickel	Y	Y	N	2.1E-03	lb/MMscf	1	1.0E-05	4.5E-05
Polycyclic Organic Matter	Y	N	N	4.0E-05	lb/MMBtu	2	2.0E-04	8.8E-04
Phenanthrene	Y	N	Y	1.7E-05	lb/MMscf	1	8.3E-08	3.7E-07
Pyrene	Y	N	Y	5.0E-06	lb/MMscf	1	2.5E-08	1.1E-07
Selenium compounds	Y	N	N	2.4E-05	lb/MMscf	1	1.2E-07	5.2E-07
Toluene	Y	Y	Y	3.4E-03	lb/MMscf	1	1.7E-05	7.3E-05
Total HAP Emissions (related to natural gas/propane)							**0.020**	**0.088**
Total TAP Emissions (related to natural gas/propane)							**0.032**	**0.14**

Notes:

1. Emission factors for natural gas combustion are from NCDAQ Natural Gas Combustion Spreadsheet and AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98. The emission factors for acetaldehyde, acrolein, and ammonia are cited in the NCDAQ spreadsheet as being sourced from the USEPA's WebFIRE database.
2. The duct burners can fire either natural gas or propane; Propane is worst-case for these HAP emissions. Emission factors for propane combustion from the South Coast Air Quality Management District's Air Emissions Reporting Tool for external combustion equipment fired with LPG.

Table 4e
Potential Emissions
Dryer #2 Double Duct Burners (IES-DDB-3 and -4)
Enviva Pellets Northampton, LLC

Abbreviations:

CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
LPG - liquified petroleum gas
Mgal - thousand gallons
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
NO_X - nitrogen oxides
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
RTO - regenerative thermal oxidizer
SO_2 - sulfur dioxide
TAP - toxic air pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.

U.S. EPA. AP-42, Section 1.5 - Liquefied Petroleum Gas Production, 07/08.

South Coast Air Quality Management District. AER Reporting tool. Emission factors available in the Help and Support Manual at: http://www.aqmd.gov/home/rules-compliance/compliance/annual-emission-reporting

U.S. EPA WebFIRE database available at: https://cfpub.epa.gov/webfire/

A National Methodology and Emission Inventory for Residential Fuel Combustion (2001). Retrieved from https://www3.epa.gov/ttnchie1/conference/ei12/area/haneke.pdf.

Table 5
Potential Emissions
Propane Vaporizer (IES-PVAP)
Enviva Pellets Northampton, LLC

Calculation Basis

Heat Content[1]	91.5	MMBtu/10^3 gal propane
Hours of Operation	8,760	hr/yr
Vaporizer Heat Input[2]	1.00	MMBtu/hr

Notes:
1. Propane heat content from AP-42 Section 1.5 - Liquefied Petroleum Gas Production, 7/08, Table 1.5-1, footnote a.
2. Heat input based on information provided by Enviva in August 2018.

Potential Criteria Pollutant Emissions

Pollutant	Emission Factor [1]	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	7.5	lb/10^3 gal	0.08	0.36
NO_X	13.0	lb/10^3 gal	0.14	0.62
SO_2[2]	0.05	lb/10^3 gal	0.001	0.003
TOC	1.0	lb/10^3 gal	0.01	0.05
$PM/PM_{10}/PM_{2.5}$[3]	0.70	lb/10^3 gal	0.01	0.03

Notes:
1. Emission factors obtained from AP 42 1.5, Liquefied Petroleum Gas Production, 10/96, Table 1.5-1.
2. AP 42 1.5, Liquefied Petroleum Gas Production, 10/96, Table 1.5-1 provides an SO_2 emission factor of 0.10S, where S equals the sulfur content of the fuel. The national sulfur fuel content for LPG of 0.54 grains/100 ft^3 as assigned by EPA was used (Source: A National Methodology and Emission Inventory for Residential Fuel Combustion).
3. All particulate matter was conservatively assumed to be less than 2.5 microns in size.

Potential HAP Emissions

Pollutant	CAS No.	Emission Factor[1]	Potential Emissions	
		(lb/MMBtu)	Max (lb/hr)	Annual (tpy)
Benzene	71-43-2	7.1E-04	7.10E-04	3.11E-03
Formaldehyde	50-00-0	1.5E-03	1.50E-03	6.57E-03
PAHs		4.0E-05	4.0E-05	1.75E-04
Total HAP Emissions			**0.002**	**0.010**

Notes:
1. Emission factors for propane combustion from the South Coast Air Quality Management District's Air Emissions Reporting Tool for external combustion equipment fired with LPG.

Abbreviations:

CAS - chemical abstract service
gal - gallon
HAP - hazardous air pollutant
hp - horsepower
hr - hour
lb - pound
MMBtu - Million British thermal units
NO_X - nitrogen oxides
ODT - oven dried tons
PAH - polycyclic aromatic hydrocarbon
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
tpy - tons per year
TOC - total organic compounds
yr - year

References:

U.S. EPA. AP-42, Section 1.5 - Liquefied Petroleum Gas Production, 07/08.
South Coast Air Quality Management District. AER Reporting tool. Emission factors available in the Help and Support Manual at:
http://www.aqmd.gov/home/rules-compliance/compliance/annual-emission-reporting
A National Methodology and Emission Inventory for Residential Fuel Combustion (2001). Retrieved from
https://www3.epa.gov/ttnchie1/conference/ei12/area/haneke.pdf.

Table 6
Potential Emissions at Outlet of RCO-2 Stack (CD-RCO-2)
Pellet Coolers (ES-CLR-1 through ES-CLR-6)
Enviva Pellets Northampton, LLC

Calculation Basis

Annual Throughput	781,255 ODT/yr
Hourly Throughput	144 ODT/hr
Hours of Operation	8,760 hr/yr
Number of Burners	2 burners
RCO/RTO Burner Rating	6.2 MMBtu/hr
RCO/RTO Control Efficiency	95.0%

Pellet Cooler and Pellet Mill Potential Process VOC and HAP Emissions

Pollutant	CAS No.	NC TAP	VOC	Emission Factor[1]	Emissions at RCO/RTO Outlet[2]	
				(lb/ODT)	Max (lb/hr)	Annual (tpy)
Acetaldehyde	75-07-0	Y	Y	0.025	0.181	0.49
Acrolein	107-02-8	Y	Y	0.050	0.36	0.97
Formaldehyde	50-00-0	Y	Y	0.006	0.04	0.12
Methanol	67-56-1	N	Y	0.021	0.15	0.41
Phenol	108-95-2	Y	Y	0.025	0.18	0.49
Propionaldehyde	123-38-6	N	Y	0.015	0.105	0.29
				Total HAP Emissions	**1.02**	**2.78**
				Total TAP Emissions	**0.77**	**2.08**
Total VOC (as propane)	--	--	Y	1.4	10.17	27.60

Notes:

1. Emission factors based on process knowledge and an appropriate contingency based on engineering judgement. The emission factors represent uncontrolled emissions.

2. A 95.0% control efficiency is applied to the potential emissions for the RTO.

Emissions from the pellet mills and pellet coolers will be controlled by an RCO/RTO that can operate in either catalytic mode (RCO) or thermal mode (RTO). The RTO and RCO modes have the same control efficiency so there will be no impact on emissions when switching between operating modes.

Thermally Generated Potential Criteria Pollutant Emissions

Maximum high heating value of VOC constituents	1.8E-02	MMBtu/lb
Uncontrolled VOC emissions	552	tons/yr
Uncontrolled VOC emissions	203	lb/hr
Heat input of uncontrolled VOC emissions	20,417	MMBtu/yr
Heat input of uncontrolled VOC emissions	4	MMBtu/hr

Pollutant	Emission Factor[1]	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	8.2E-02	lb/MMBtu	0.31	0.84
NO_X	9.8E-02	lb/MMBtu	0.37	1.00

Natural Gas Combustion Potential Criteria Pollutant Emissions

Pollutant	Emission Factor[1]	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	8.2E-02	lb/MMBtu	1.02	4.47
NO_X	4.9E-02	lb/MMBtu	0.61	2.66
SO_2	5.9E-04	lb/MMBtu	0.0073	0.032
VOC	5.4E-03	lb/MMBtu	0.067	0.29
Total PM	7.5E-03	lb/MMBtu	0.092	0.40
Total PM_{10}	7.5E-03	lb/MMBtu	0.092	0.40
Total $PM_{2.5}$	7.5E-03	lb/MMBtu	0.092	0.40

Potential Criteria Pollutant Emissions - Propane Combustion

Pollutant	Emission Factor[2]	Units	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
CO	7.50	lb/Mgal	1.02	4.45
NO_X	13.0	lb/Mgal	1.76	7.72
SO_2	0.054	lb/Mgal	0.0073	0.032
VOC	1.00	lb/Mgal	0.14	0.59
$PM/PM_{10}/PM_{2.5}$ Condensable	0.50	lb/Mgal	0.068	0.30
$PM/PM_{10}/PM_{2.5}$ Filterable	0.20	lb/Mgal	0.027	0.12
Total $PM/PM_{10}/PM_{2.5}$			0.095	0.42

Table 6
Potential Emissions at Outlet of RCO-2 Stack (CD-RCO-2)
Pellet Coolers (ES-CLR-1 through ES-CLR-6)
Enviva Pellets Northampton, LLC

Natural Gas Combustion Potential HAP and TAP Emissions

Pollutant	HAP	NC TAP	VOC	Emission Factor	Units	Footnote	Potential Emissions	
							Max (lb/hr)	Annual (tpy)
Natural Gas Source								
2-Methylnaphthalene	Y	N	Y	2.4E-05	lb/MMscf	3	2.9E-07	1.3E-06
3-Methylchloranthrene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
7,12-Dimethylbenz(a)anthracene	Y	N	Y	1.6E-05	lb/MMscf	3	1.9E-07	8.5E-07
Acenaphthene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
Acenaphthylene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
Acetaldehyde	Y	Y	Y	1.5E-05	lb/MMscf	3	1.8E-07	8.1E-07
Acrolein	Y	Y	Y	1.8E-05	lb/MMscf	3	2.2E-07	9.58E-07
Ammonia	N	Y	N	3.2	lb/MMscf	3	3.89E-02	1.70E-01
Anthracene	Y	N	Y	2.4E-06	lb/MMscf	3	2.9E-08	1.3E-07
Arsenic	Y	Y	N	2.0E-04	lb/MMscf	3	2.4E-06	1.1E-05
Benz(a)anthracene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
Benzene	Y	N	Y	7.1E-04	lb/MMBtu	4	8.8E-03	3.9E-02
Benzo(a)pyrene	Y	Y	Y	1.2E-06	lb/MMscf	3	1.5E-08	6.4E-08
Benzo(b)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
Benzo(g,h,i)perylene	Y	N	Y	1.2E-06	lb/MMscf	3	1.5E-08	6.4E-08
Benzo(k)fluoranthene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
Beryllium	Y	Y	N	1.2E-05	lb/MMscf	3	1.5E-07	6.4E-07
Cadmium	Y	Y	N	1.1E-03	lb/MMscf	3	1.3E-05	5.9E-05
Chromium VI	Y	N	N	1.4E-03	lb/MMscf	3	1.7E-05	7.5E-05
Chrysene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
Cobalt Compounds	Y	N	N	8.4E-05	lb/MMscf	3	1.0E-06	4.5E-06
Dibenzo(a,h)anthracene	Y	N	Y	1.2E-06	lb/MMscf	3	1.5E-08	6.4E-08
Dichlorobenzene	Y	Y	Y	1.2E-03	lb/MMscf	3	1.5E-05	6.4E-05
Fluoranthene	Y	N	Y	3.0E-06	lb/MMscf	3	3.6E-08	1.6E-07
Fluorene	Y	N	Y	2.8E-06	lb/MMscf	3	3.4E-08	1.5E-07
Formaldehyde	Y	Y	Y	1.5E-03	lb/MMBtu	4	1.9E-02	8.1E-02
Hexane	Y	Y	Y	1.8	lb/MMscf	3	2.2E-02	9.6E-02
Indeno(1,2,3-cd)pyrene	Y	N	Y	1.8E-06	lb/MMscf	3	2.2E-08	9.6E-08
Lead	Y	N	N	5.0E-04	lb/MMscf	3	6.1E-06	2.7E-05
Manganese	Y	Y	N	3.8E-04	lb/MMscf	3	4.6E-06	2.0E-05
Mercury	Y	Y	N	2.6E-04	lb/MMscf	3	3.2E-06	1.4E-05
Naphthalene	Y	N	Y	6.1E-04	lb/MMscf	3	7.4E-06	3.2E-05
Nickel	Y	Y	N	2.1E-03	lb/MMscf	3	2.6E-05	1.1E-04
Polycyclic Organic Matter	Y	N	N	4.0E-05	lb/MMBtu	4	5.0E-04	2.2E-03
Phenanthrene	Y	N	Y	1.7E-05	lb/MMscf	3	2.1E-07	9.1E-07
Pyrene	Y	N	Y	5.0E-06	lb/MMscf	3	6.1E-08	2.7E-07
Selenium compounds	Y	N	N	2.4E-05	lb/MMscf	3	2.9E-07	1.3E-06
Toluene	Y	Y	Y	3.4E-03	lb/MMscf	3	4.1E-05	1.8E-04
					Total HAP Emissions (natural gas combustion)		**0.050**	**0.22**
					Total TAP Emissions (natural gas combustion)		**0.08**	**0.35**

Notes:

1. Emission factors from AP-42, Section 1.4 - Natural Gas Combustion, 07/98. Emission factors converted from lb/MMscf to lb/MMBtu based on assumed heating value of 1,020 Btu/scf for natural gas per AP-42 Section 1.4.
2. Emission factors for propane combustion obtained from AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion, 07/08.
3. Emission factors for natural gas combustion are from NCDAQ Natural Gas Combustion Spreadsheet and AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98 for small boilers. The emission factors for acetaldehyde, acrolein, and ammonia are cited in the NCDAQ spreadsheet as being sourced from the USEPA's WebFIRE database.
4. The RCO/RTO burner can fire either natural gas or propane; Propane is worst-case for these HAP emissions. Emission factors for propane combustion from the South Coast Air Quality Management District's Air Emissions Reporting Tool for external combustion equipment fired with LPG.

Abbreviations:

CAS - chemical abstract service
CO - carbon monoxide
HAP - hazardous air pollutant
hr - hour
lb - pound
LPG - liquified petroleum gas
Mgal - thousand gallons
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NC - North Carolina
ODT - oven dried tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
RCO - regenerative catalytic oxidizer
RTO - regenerative thermal oxidizer
TAP - toxic air pollutant
tpy - tons per year
SO_2 - sulfur dioxide
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 1.4 - Natural Gas Combustion, 07/98.
U.S. EPA. AP-42, Section 1.5 - Liquefied Petroleum Gas Production, 07/08.
South Coast Air Quality Management District. AER Reporting tool. Emission factors available in the Help and Support Manual at:
U.S. EPA WebFIRE database available at: https://cfpub.epa.gov/webfire/
A National Methodology and Emission Inventory for Residential Fuel Combustion (2001). Retrieved from https://www3.epa.gov/ttnchie1/conference/ei12/area/haneke.pdf.

Table 7
Potential VOC and HAP Emissions
Dried Wood Handling 1 and 2 (ES-DWH-1 and ES-DWH-2)
Enviva Pellets Northampton, LLC

Calculation Basis

Hourly Throughput[1]	154 ODT/hr
Annual Throughput[1]	781,255 ODT/yr

Potential Criteria Pollutant Emissions

Pollutant	Emission Factor (lb/ODT)	Potential Emissions[4]	
		Max (lb/hr)	Annual (tpy)
Formaldehyde[2]	8.4E-04	0.13	0.33
Methanol[2]	2.0E-03	0.30	0.76
Propionaldehyde[5]	2.1E-04	0.03	0.08
Total HAP Emissions		**0.46**	**1.17**
VOC as carbon[2]	0.10	15.6	39.5
VOC as propane[3]	0.12	19.1	48.5

Notes:

1. Hourly and annual throughputs assumed to be the same as the combined dryer throughputs.
2. Emission factors derived from NCASI's Wood Products Database (February 2013) for dry wood handling operations at an OSB mill, mean emission factors. The emission factors were converted from lb/MSF (3/8") to lb/ODT using the typical density and moisture content of an OSB panel.
3. VOC as propane = (1.22 x VOC as carbon) + formaldehyde.
4. As emissions are based on throughput, the calculated emissions represent the total emissions from Dried Wood Handling 1 and 2 (ES-DWH-1 and ES-DWH-2).
5. Emission factor based on process knowledge and an appropriate contingency based on engineering judgement.

Abbreviations:

hr - hour
lb - pound
ODT - oven dried tons
tpy - tons per year
VOC - volatile organic compound
yr - year

Table 8
Potential PM Emissions from Baghouses/Cyclones
Enviva Pellets Northampton, LLC

Emission Unit ID	Source Description	Control Device ID	Control Device Description	Exhaust Flow Rate[1]	Exit Grain Loading[2]	Annual Operation	Particulate Speciation		Potential Emissions					
									PM		PM_{10}		$PM_{2.5}$	
				(cfm)	(gr/cf)	(hours)	PM_{10} (% of PM)	$PM_{2.5}$ (% of PM)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)
ES-PCHP	Pellet Cooler HP Fines Relay System	CD-PCHP-BV	One (1) baghouse[4]	3,600	0.004	8,760	100%	100%	0.12	0.54	0.12	0.54	0.12	0.54
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BV	One (1) baghouse[4]	2,500	0.004	8,760	100%	100%	0.086	0.38	0.086	0.38	0.086	0.38
ES-CLR-1	Pellet Cooler	CD-CLR-1	One (1) existing Cyclone[5]	17,100	0.01	8,760	26.1%	3.2%	1.47	6.42	0.38	1.68	0.047	0.21
ES-CLR-2	Pellet Cooler	CD-CLR-2	One (1) existing Cyclone[5]	17,100	0.01	8,760	26.1%	3.2%	1.47	6.42	0.38	1.68	0.047	0.21
ES-CLR-3	Pellet Cooler	CD-CLR-3	One (1) existing Cyclone[5]	17,100	0.01	8,760	26.1%	3.2%	1.47	6.42	0.38	1.68	0.047	0.21
ES-CLR-4	Pellet Cooler	CD-CLR-4	One (1) existing Cyclone[5]	17,100	0.01	8,760	26.1%	3.2%	1.47	6.42	0.38	1.68	0.047	0.21
ES-CLR-5	Pellet Cooler	CD-CLR-5	One (1) existing Cyclone[5]	17,100	0.01	8,760	26.1%	3.2%	1.47	6.42	0.38	1.68	0.047	0.21
ES-CLR-6	Pellet Cooler	CD-CLR-6	One (1) existing Cyclone[5]	17,100	0.01	8,760	26.1%	3.2%	1.47	6.42	0.38	1.68	0.047	0.21
ES-DWH-2	Dried Wood Handling-2	CD-DWH-BF-2	One (1) baghouse	2,500	0.004	8,760	100%	100%	0.086	0.38	0.086	0.38	0.086	0.38
ES-DSR	Dry Shavings Reception	CD-DSR-BF	One (1) baghouse	2,500	0.004	8760	100%	100%	0.086	0.38	0.086	0.38	0.086	0.38
ES-FPH; ES-PB-1 through 12; ES-PL-1 and -2	Finished Product Handling; Twelve pellet loadout bins; Pellet mill loadout 1 and 2	CD-FPH-BF	One (1) baghouse[3,6]	35,500	0.004	8,760	91%	40%	1.22	5.33	1.11	4.85	0.49	2.13
ES-DSS	Dry Shavings Silo	CD-DSS-BF	One (1) baghouse[4]	500	0.004	8,760	100%	100%	0.02	0.08	0.02	0.08	0.02	0.08

Notes:

1. Filter, Vent, and Cyclone inlet flow rate (cfm) provided by design engineering firm (Mid-South Engineering Co.). The exit flowrate was conservatively assumed to be the same as the inlet flowrate.
2. Pollutant loading provided by Aircon.
3. Finished product handling $PM_{2.5}$ speciation based on review of NCASI data for similar baghouses in the wood products industry.
4. No speciation data is available for $PM_{10}/PM_{2.5}$. Therefore, it is conservatively assumed to be equal to total PM.
5. Pellet cooler $PM_{10}/PM_{2.5}$ speciation based on process knowledge and engineering judgement.
6. Finished product handling PM_{10} speciation based on AP-42 factors for wet wood combustion (Section 1.6) controlled by a mechanical separator. Since the particle size of particulate matter from a pellet cooler is anticipated to be larger than flyash, this factor is believed to be a conservative indicator of speciation.

Abbreviations:

cf - cubic feet
cfm - cubic feet per minute
ES - Emission Sources
IES - Insignificant Emission Source
gr - grain
hr - hour
lb - pound
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
tpy - tons per year

Reference:

U.S. EPA. AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03

Table 9a
Potential Emissions from Material Handling
Enviva Pellets Northampton, LLC

Source	Transfer Activity[1]	Control	Control Description	Number of Drop Points	Material Moisture Content	PM Emission Factor[1]	PM_{10} Emission Factor[1]	$PM_{2.5}$ Emission Factor[1]	Potential Throughput[2]		Potential PM Emissions		Potential PM_{10} Emissions		Potential $PM_{2.5}$ Emissions	
					(%)	(lb/ton)	(lb/ton)	(lb/ton)	(tph)	(tpy)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)
ES-GWHS	Material feed conveyance system to dryer burner fuel storage bin	--	--	5	48%	3.7E-05	1.8E-05	2.7E-06	44	389,054	8.3E-03	3.6E-02	3.9E-03	1.7E-02	5.9E-04	2.6E-03
	Material feed conveyance system to raw wood chip storage pile	--	--	1	48%	3.7E-05	1.8E-05	2.7E-06	400	1,502,414	1.5E-02	2.8E-02	7.1E-03	1.3E-02	1.1E-03	2.0E-03
	Material feed conveyance system to dryer burner[3]	--	--	0	45%	4.1E-05	1.9E-05	2.9E-06	44	389,054	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Material feed conveyance system to rotary drum wood dryer[3]	--	--	0	48%	3.7E-05	1.8E-05	2.7E-06	300	1,502,414	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Material feed conveyance system to fuel storage piles	--	--	3	45%	4.1E-05	1.9E-05	2.9E-06	44	389,054	5.5E-03	2.4E-02	2.6E-03	1.1E-02	3.9E-04	1.7E-03
IES-DLH	Drop point for dry shavings to dry line hopper	--	--	1	8.0%	4.6E-04	2.2E-04	3.3E-05	10.0	87,600	4.6E-03	2.0E-02	2.2E-03	9.5E-03	3.3E-04	1.4E-03
ES-DLC-1	Drop point for dry line hopper to dry line feed conveyor	--	--	1	8.0%	4.6E-04	2.2E-04	3.3E-05	10.0	87,600	4.6E-03	2.0E-02	2.2E-03	9.5E-03	3.3E-04	1.4E-03
IES-DRYSHAVE	Existing dry shaving walking floor truck dump	--	--	1	8.0%	4.6E-04	2.2E-04	3.3E-05	48.0	87,600	2.2E-02	2.0E-02	1.0E-02	9.5E-03	1.6E-03	1.4E-03
	Existing dry shaving loader	--	--	2	8.0%	4.6E-04	2.2E-04	3.3E-05	10.0	87,600	9.2E-03	4.0E-02	4.3E-03	1.9E-02	6.6E-04	2.9E-03
IES-ADD	Additive Handling and Storage	--	--	1	0.25%	5.9E-02	2.8E-02	4.2E-03	1.0	8,760	5.9E-02	2.6E-01	2.8E-02	1.2E-01	4.2E-03	1.8E-02
ES-PS-1 and 2	Drop points from the dry line feed conveyor to the Dry Hammermill Pre-screeners	--	--	2	17.0%	1.6E-04	7.6E-05	1.1E-05	300.0	1,502,414	9.6E-02	2.4E-01	4.5E-02	1.1E-01	6.9E-03	1.7E-02
ES-DWH-1	Dried Wood Handling 1[4]	--	--	2	17.0%	1.6E-04	7.6E-05	1.1E-05	185.3	941,271	5.9E-02	1.5E-01	2.8E-02	7.1E-02	4.2E-03	1.1E-02
										Total Emissions:	**0.28**	**0.84**	**0.13**	**0.40**	**0.020**	**0.060**

Notes:

1. Emission factor calculation based on formula from AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles, Equation 1, (11/06).

   where: E = emission factor (lb/ton)
   k = particle size multiplier (dimensionless) for PM 0.74
   k = particle size multiplier (dimensionless) for PM_{10} 0.35
   k = particle size multiplier (dimensionless) for $PM_{2.5}$ 0.053
   U = mean wind speed (mph) 6.3

2. Throughputs represent actual weight of materials. Throughput for dry shaving material handling is based on comparable Enviva facilities.
3. Activity is enclosed and there are no associated emissions.
4. Emissions from dried wood handling associated with the existing dryer line are controlled by an existing passive bin vent.

Abbreviations:

hr - hour
lb - pound
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
tpy - tons per year
yr - year

References:

U.S. EPA. AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles, 11/06.

Table 9b
Potential Emissions from Wood Storage Pile Wind Erosion
Enviva Pellets Northampton, LLC

Source	Description	PM Emission Factor[1]		VOC Emission Factor[2]		Pile Width/ Diameter	Pile Length	Pile Height	Outer Surface Area of Pile[3]	Potential PM Emissions		Potential PM_{10} Emissions		Potential $PM_{2.5}$ Emissions		Potential VOC Emissions as propane[4]	
		(lb/day/acre)	(lb/hr/ft^2)	(lb/day/acre)	(lb/hr/ft^2)	(ft)	(ft)	(ft)	(ft^2)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)	Max (lb/hr)	Annual (tpy)
IES-DRYSHAVE	Dry Shaving Storage Pile	8.6	8.2E-06	3.6	3.4E-06	100	--	25	10,537	0.09	0.38	0.04	0.19	0.007	0.03	0.04	0.19
IES-GWHS	Green Wood Storage Pile No. 1	8.6	8.2E-06	3.6	3.4E-06	155	--	72	30,907	0.25	1.11	0.13	0.56	0.019	0.08	0.13	0.57
	Green Wood Storage Pile No. 2	8.6	8.2E-06	3.6	3.4E-06	350	400	25	213,000	1.75	7.67	0.88	3.84	0.131	0.58	0.89	3.92
	Green Wood Storage Pile No. 3	8.6	8.2E-06	3.6	3.4E-06	150	150	25	45,000	0.37	1.62	0.19	0.81	0.028	0.12	0.19	0.83
	Green Wood Storage Pile No. 4	8.6	8.2E-06	3.6	3.4E-06	200	200	25	72,000	0.59	2.59	0.30	1.30	0.044	0.19	0.30	1.32
	Bark Fuel Storage Pile No. 1	8.6	8.2E-06	3.6	3.4E-06	150	150	25	45,000	0.37	1.62	0.185	0.81	2.8E-02	0.122	0.19	0.83
	Bark Fuel Storage Pile No. 2	8.6	8.2E-06	3.6	3.4E-06	100	200	25	42,000	0.345	1.513	0.173	0.757	2.6E-02	1.1E-01	0.18	0.77
	Bark Fuel Storage Pile No. 3	8.6	8.2E-06	3.6	3.4E-06	50	--	25	3,332	0.027	0.120	0.014	0.060	2.1E-03	9.0E-03	0.014	0.061
									Total Emissions:	**3.80**	**16.6**	**1.90**	**8.32**	**0.28**	**1.25**	**1.94**	**8.50**

Notes:

1. TSP emission factor based on U.S. EPA Control of Open Fugitive Dust Sources. Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988, Page 4-17.

$$E = 1.7\left(\frac{s}{1.5}\right)\left(\frac{(365-p)}{235}\right)\left(\frac{f}{15}\right)(\text{lb/day/acre})$$

where:	s, silt content of wood chips (%):	8.4	s - silt content (%) for lumber sawmills (mean) from AP-42, Section 13.2.2 - Unpaved Roads, 11/06, Table 13.2.2-1
	p, number of days with rainfall greater than 0.01 inch:	110	Based on AP-42, Section 13.2.2 - Unpaved Roads, 11/06, Figure 13.2.1-2.
	f (time that wind exceeds 5.36 m/s - 12 mph) (%):	12.5	Based on meteorological data averaged for 2012-2016 for Maxton, NC National Weather Service (NWS) Station
	PM_{10}/TSP ratio:	50%	PM_{10} is assumed to equal 50% of TSP based on U.S. EPA Control of Open Fugitive Dust Sources, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.
	$PM_{2.5}$/TSP ratio:	7.5%	$PM_{2.5}$ is assumed to equal 7.5 % of TSP U.S. EPA Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors. November 2006.

2. VOC emission factor obtained from NCASI Technical Bulletin 700. Emission factors ranged from 1.6 to 3.6 lb C/acre-day. As Enviva has engineering data that shows VOC emissions from greenwood storage piles are less than the low end of the range of the factors listed, Enviva chose to employ the maximum emission factor from the NCASI document for purposes of conservatism.
3. The surface area for rectangular piles is calculated as [2*H*L+2*W*H+L*W] + 20% to consider the sloping pile edges. Pile dimensions were provided by Enviva.
The surface area for circular piles is calculated as [Π*R*(R^2+H^2)$^{0.5}$] + 20% to consider the sloping pile edges. Diameter and height were provided by Enviva.
4. Emissions are calculated in tons of carbon per year by the following formula:
tons C/year = 5 acres * 365 days * 1.6 lb C/acre-day / 2000 lb/ton
Emission factor converted from as carbon to as propane by multiplying by 1.22.

Abbreviations:

EPA - Environmental Protection Agency
ft - feet
ft^2 - square feet
lb - pound
mph - miles per hour
NC - North Carolina
NCASI - National Council for Air and Stream Improvement, Inc.
NWS - National Weather Service
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
tpy - tons per year
TSP - total suspended particulate
VOC - volatile organic compound
yr - year

Reference:

U.S. EPA. AP-42, Section 13.2.2 - Unpaved Roads, 11/06.
U.S. EPA. Control of Open Fugitive Dust Sources, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.
U.S. EPA. Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors. November 2006.
NCASI. Technical Bulletin No. 700. Preliminary Investigation of Releases of Volatile Organic Compounds from Wood Residual Storage Piles. October 1995.

Table 10
Potential Emissions
Electric Powered Green Wood Chipper (IES-EPWC)
Enviva Pellets Northampton, LLC

Calculation Basis

Annual Throughput of Chipper	781,255	ODT/year[1]
Short Term Throughput	178.50	ODT/hr[1]
Approximate Moisture Content	50%	of total weight

Pollutant	Emission Factor		Emissions	
			Max (lb/hr)	Annual (tpy)
THC as Carbon[2]	0.0041	lb/ODT	0.73	1.60
VOC as propane[3]	0.0050	lb/ODT	0.89	1.95
Methanol[2]	0.0010	lb/ODT	0.18	0.39

Notes:

[1] The annual throughput for the chipper is conservatively assumed to be the same as the total dryer throughput. The hourly throughput for the chipper is assumed to be 85% of the debarker hourly throughput.

[2] Emission factor obtained from available emissions factors for chippers in AP-42 Section 10.6.3, Medium Density Fiberboard, 08/02, Table 7 and Section 10.6.4, Hardboard and Fiberboard, 10/02, Tables 7 and 9. Emission factors for THC and Methanol are the same across all three tables.

[3] Emission factor for VOC as propane is from AP-42, Section 10.6.3., Medium Density Fiberboard, 08/02, Table 7.

Abbreviations:

hr - hour
lb - pound
ODT - oven dried tons
THC - total hydrocarbon
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 10.6.3 - Medium Density Fiberboard, 08/02.
U.S. EPA. AP-42, Section 10.6.4 - Hardboard and Fiberboard, 10/02.

Table 11
Potential Emissions
Bark Hog (IES-BARK)
Enviva Pellets Northampton, LLC

Calculation Basis

Annual Throughput of Bark Hog	234,377	ODT/year[1]
Short-term Throughput of Bark Hog	31.50	ODT/hr[1]
Approximate Moisture Content	50%	of total weight

Pollutant	Emission Factor		Emissions	
			Max (lb/hr)	Annual (tpy)
THC as Carbon[2]	0.0041	lb/ODT	0.13	0.48
VOC as propane[3]	0.0050	lb/ODT	0.16	0.59
PM[4]	0.02	lb/ton	0.13	0.47
PM_{10}[4]	0.011	lb/ton	0.07	0.26
Methanol[2]	0.0010	lb/ODT	0.03	0.12

Notes:

[1] The annual throughput used for the bark hog is 30% of the annual throughput of the facility. The short-term throughput is 15% of maximum hourly capacity of the debarker.

[2] Emission factor obtained from available emissions factors for chippers in AP-42 Section 10.6.3, Medium Density Fiberboard, 08/02, Table 7 and Section 10.6.4, Hardboard and Fiberboard, 10/02, Tables 7 and 9. Emission factors for THC and Methanol are the same across all three tables.

[3] Emission factor for VOC as propane is from AP-42, Section 10.6.3., Medium Density Fiberboard, 08/02, Table 7.

[4] Particulate matter emission factors from the USEPA document titled *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants. Source Classification Code 3-07-008-01 (Log Debarking)* . All PM is assumed to be larger than 2.5 microns. PM emissions are assumed to be controlled due to the bark hog being partially enclosed (assumed 90% control).

Abbreviations:

hr - hour
lb - pound
ODT - oven dried tons
THC - total hydrocarbon
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 10.6.3 - Medium Density Fiberboard, 08/02.
U.S. EPA. AP-42, Section 10.6.4 - Hardboard and Fiberboard, 10/02.
U.S. EPA. 1990. *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants* . Source Classification Code 3-07-008-01 (Log Debarking).

Table 12
Potential Emissions
Debarker (IES-DEBARK)
Enviva Pellets Northampton, LLC

Calculation Basis

Hourly Throughput[1]	210 ODT/hr
Annual Throughput[1]	781,255 ODT/yr
Approximate Moisture Content	50% of total weight

Potential Criteria Pollutant Emissions

Source	Pollutant	Emission Factor (lb/ton)	Potential Emissions	
			Max (lb/hr)	Annual (tpy)
IES-DEBARK	TSP[2]	2.0E-02	0.84	1.56
	PM_{10}[2]	1.1E-02	0.46	0.86

Notes:

1. The annual throughput used for the debarker is equal to the annual throughput of the dryers. The short-term throughput is based upon the maximum capacity of the debarker.
2. Particulate matter emission factors from the USEPA document titled *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants.* Source Classification Code 3-07-008-01 (Log Debarking). All PM is assumed to be larger than 2.5 microns in diameter. PM emissions are assumed to be controlled due to the use of water spray and the bark hog being partially enclosed (assumed 90% control).

Abbreviations:

hr - hour
lb - pound
ODT - oven dried tons
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
tpy - tons per year
TSP - total suspended particulate
yr - year

Reference:

U.S. EPA. 1990. *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants* . Source Classification Code 3-07-008-01 (Log Debarking).

Table 13
Potential Emissions
Emergency Generators (IES-GN-1 and IES-GN-2) and Fire Water Pump (IES-FWP)
Enviva Pellets Northampton, LLC

Emergency Generator 1 - Emissions (IES-GN-1)

Equipment and Fuel Characteristics

Engine Output	0.26	MW
Engine Power	350	hp (brake)
Hours of Operation	500	hr/yr[1]
Heating Value of Diesel	19,300	Btu/lb
Power Conversion	7,000	Btu/hr/hp

Criteria Pollutant Emissions

Pollutant	Category	Emission Factor	Units	Emissions	
				Max lb/hr	Annual tpy
TSP	PSD	4.41E-04	lb/kW-hr (2)	0.12	2.88E-02
PM_{10}	PSD	4.41E-04	lb/kW-hr (2)	0.12	2.88E-02
$PM_{2.5}$	PSD	4.41E-04	lb/kW-hr (2)	0.12	2.88E-02
NO_x	PSD	8.82E-03	lb/kW-hr (5)	2.30	5.75E-01
SO_2	PSD	15	ppmw (3)	3.81E-03	9.52E-04
CO	PSD	7.72E-03	lb/kW-hr (2)	2.01	5.03E-01
VOC (NMHC)	PSD	2.51E-03	lb/MMBtu (4)	6.15E-03	1.54E-03

Hazardous Air Pollutant Emissions

Pollutant	Category	Emission Factor	Units	Emissions	
				Max lb/hr	Annual tpy
Acetaldehyde	HAP	5.37E-06	lb/hp-hr (4)	1.88E-03	4.70E-04
Acrolein	HAP	6.48E-07	lb/hp-hr (4)	2.27E-04	5.67E-05
Benzene	HAP	6.53E-06	lb/hp-hr (4)	2.29E-03	5.71E-04
Benzo(a)pyrene[6]	HAP	1.32E-09	lb/hp-hr (4)	4.61E-07	1.15E-07
1,3-Butadiene	HAP	2.74E-07	lb/hp-hr (4)	9.58E-05	2.39E-05
Formaldehyde	HAP	8.26E-06	lb/hp-hr (4)	2.89E-03	7.23E-04
Total PAH (POM)	HAP	1.18E-06	lb/hp-hr (4)	4.12E-04	1.03E-04
Toluene	HAP	2.86E-06	lb/hp-hr (4)	1.00E-03	2.51E-04
Xylenes	HAP	2.00E-06	lb/hp-hr (4)	6.98E-04	1.75E-04
			Highest HAP (Formaldehyde)	2.89E-03	7.23E-04
			Total HAPs	9.49E-03	2.37E-03

Notes:

[1] NSPS allows for only 100 hrs/yr of non-emergency operation of these engines (not the 500 hours shown). The PTE for the emergency generator is based on 500 hr/yr, though, because the regs allow non-emergency operation and EPA guidance is 500 hr/yr for emergency generators.

[2] Emissions factors from NSPS Subpart IIII (or 40 CFR 89.112 where applicable) in compliance with post-2009 construction.

[3] Sulfur content in accordance with Year 2010 standards of 40 CFR 80.510(a) as required by NSPS Subpart IIII.

[4] Emission factor obtained from AP-42 Section 3.3, Tables 3.3-1 Table 3.3-2.

[5] Emission factor for NOx is listed as NOx and NMHC (Non-Methane Hydrocarbons or VOC) in Table 4 of NSPS Subpart IIII. conservatively assumed entire limit attributable to NOx.

[6] Benzo(a)pyrene is included as a HAP in Total PAH.

Table 13
Potential Emissions
Emergency Generators (IES-GN-1 and IES-GN-2) and Fire Water Pump (IES-FWP)
Enviva Pellets Northampton, LLC

Emergency Generator 2 - Emissions (IES-GN-2)

Equipment and Fuel Characteristics

Engine Output	500	kW
Engine Power	671	hp (brake)
Hours of Operation	500	hr/yr[1]
Heating Value of Diesel	19,300	Btu/lb
Power Conversion	7,000	Btu/hr/hp

Criteria Pollutant Emissions

Pollutant	Category	Emission Factor	Units	Emissions	
				Max lb/hr	Annual tpy
PM	PSD	0.021	g/hp-hr (2)	0.03	7.8E-03
PM_{10}	PSD	0.021	g/hp-hr (2)	0.03	7.8E-03
$PM_{2.5}$	PSD	0.021	g/hp-hr (2)	0.03	7.8E-03
NO_x	PSD	6.65	g/hp-hr (2)	9.83	2.46
SO_2	PSD	15.0	ppmw (3)	7.3E-03	1.8E-03
CO	PSD	0.39	g/hp-hr (2)	0.58	0.14
VOC (NMHC)	PSD	0.01	lb/hp-hr (2)	6.71	1.68

Hazardous Air Pollutant Emissions

Pollutant	Category	Emission Factor	Units	Emissions	
				Max lb/hr	Annual tpy
Acetaldehyde	HAP	2.52E-05	lb/MMTbu (4)	1.18E-04	2.96E-05
Acrolein	HAP	7.88E-06	lb/MMTbu (4)	3.70E-05	9.25E-06
Benzene	HAP	7.76E-04	lb/MMTbu (4)	3.64E-03	9.11E-04
Benzo(a)pyrene[5]	HAP	2.57E-07	lb/MMTbu (4)	1.21E-06	3.02E-07
Formaldehyde	HAP	7.89E-05	lb/MMTbu (4)	3.70E-04	9.26E-05
Naphthalene[5]	HAP	1.30E-04	lb/MMTbu (4)	6.10E-04	1.53E-04
Total PAH (POM)	HAP	2.12E-04	lb/MMTbu (4)	9.95E-04	2.49E-04
Toluene	HAP	2.81E-04	lb/MMTbu (4)	1.32E-03	3.30E-04
Xylenes	HAP	1.93E-04	lb/MMTbu (4)	9.06E-04	2.26E-04
			Highest HAP (Benzene)	3.64E-03	9.11E-04
			Total HAPs	7.39E-03	1.85E-03

Notes:

[1] NSPS allows for only 100 hrs/yr of non-emergency operation of these engines (not the 500 hours shown). The PTE for the emergency generator is based on 500 hr/yr, though, because the regs allow non-emergency operation and EPA guidance is 500 hr/yr for emergency generators.

[2] Emission factors for Particulate Matter (TSP/PM10/PM2.5), Nitrous Oxide (NOx), Volatile Organic Matter (VOC), and Carbon Monoxide (CO) obtained from generator's spec sheet. The generator's spec sheet does not include an emission factor for VOC so the hydrocarbon (HC) emission factor was used as a surrogate for VOC.

[3] Sulfur content in accordance with Year 2013 standards of 40 CFR 80.510(a) as required by NSPS Subpart IIII.

[4] Emission factor obtained from AP-42 Section 3.4, Tables 3.4-3 Table 3.4-4.

[5] Benzo(a)pyrene and naphthalene are included as HAPs in Total PAH.

Table 13
Potential Emissions
Emergency Generators (IES-GN-1 and IES-GN-2) and Fire Water Pump (IES-FWP)
Enviva Pellets Northampton, LLC

Firewater Pump Emissions (IES-FWP)

Equipment and Fuel Characteristics

Engine Output	0.22	MW
Engine Power	300	hp
Hours of Operation	500	hr/yr[1]
Heating Value of Diesel	19,300	Btu/lb
Power Conversion	7,000	Btu/hr/hp

Criteria Pollutant Emissions

Pollutant	Category	Emission Factor	Units	Emissions	
				Max lb/hr	Annual tpy
TSP	PSD	4.41E-04	lb/kW-hr (2)	0.10	2.47E-02
PM_{10}	PSD	4.41E-04	lb/kW-hr (2)	0.10	2.47E-02
$PM_{2.5}$	PSD	4.41E-04	lb/kW-hr (2)	0.10	2.47E-02
NO_x	PSD	8.82E-03	lb/kW-hr (5)	1.97	4.93E-01
SO_2	PSD	15	ppmw (3)	3.26E-03	8.16E-04
CO	PSD	7.72E-03	lb/kW-hr (2)	1.73	4.32E-01
VOC (NMHC)	PSD	2.51E-03	lb/MMBtu (4)	5.27E-03	1.32E-03

Hazardous Air Pollutant Emissions

Pollutant	Category	Emission Factor	Units	Emissions	
				Max lb/hr	Annual tpy
Acetaldehyde	HAP	5.37E-06	lb/hp-hr (4)	1.61E-03	4.03E-04
Acrolein	HAP	6.48E-07	lb/hp-hr (4)	1.94E-04	4.86E-05
Benzene	HAP	6.53E-06	lb/hp-hr (4)	1.96E-03	4.90E-04
Benzo(a)pyrene[6]	HAP	1.32E-09	lb/hp-hr (4)	3.95E-07	9.87E-08
1,3-Butadiene	HAP	2.74E-07	lb/hp-hr (4)	8.21E-05	2.05E-05
Formaldehyde	HAP	8.26E-06	lb/hp-hr (4)	2.48E-03	6.20E-04
Total PAH (POM)	HAP	1.18E-06	lb/hp-hr (4)	3.53E-04	8.82E-05
Toluene	HAP	2.86E-06	lb/hp-hr (4)	8.59E-04	2.15E-04
Xylenes	HAP	2.00E-06	lb/hp-hr (4)	5.99E-04	1.50E-04
			Highest HAP (Formaldehyde)	2.48E-03	6.20E-04
			Total HAPs	8.13E-03	2.03E-03

Notes:

[1] NSPS allows for only 100 hrs/yr of non-emergency operation of these engines (not the 500 hours shown). The PTE for the emergency generator is based on 500 hr/yr, though, because the regs allow non-emergency operation and EPA guidance is 500 hr/yr for emergency generators.

[2] Emissions factors from NSPS Subpart IIII (or 40 CFR 89.112 where applicable) in compliance with post-2009 construction.

[3] Sulfur content in accordance with Year 2010 standards of 40 CFR 80.510(a) as required by NSPS Subpart IIII.

[4] Emission factor obtained from AP-42 Section 3.3, Tables 3.3-1 Table 3.3-2.

[5] Emission factor for NOx is listed as NOx and NMHC (Non-Methane Hydrocarbons or VOC) in Table 4 of NSPS Subpart IIII. Conservatively assumed entire limit attributable to NOx.

[6] Benzo(a)pyrene is included as a HAP in Total PAH.

Table 13
Potential Emissions
Emergency Generators (IES-GN-1 and IES-GN-2) and Fire Water Pump (IES-FWP)
Enviva Pellets Northampton, LLC

Abbreviations:

Btu - British thermal unit
CARB - California Air Resources Board
CAS - chemical abstract service
CFR - Code of Federal Regulations
CH_4 - methane
CO - carbon monoxide
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
g - gram
gal - gallon
HAP - hazardous air pollutant
hp - horsepower
hr - hour
kg - kilogram
kW - kilowatt
lb - pound
MW - megawatt
MMBtu - Million British thermal units
NMHC - Non-methane hydrocarbon
NO_X - nitrogen oxides
N_2O - nitrous oxide
NSPS - New Source Performance Standards
ODT - oven dried tons
PAH - polycyclic aromatic hydrocarbon
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
POM - polycyclic organic matter
ppmw - parts per million by weight
PSD - prevention of significant deterioration
PTE - potential to emit
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

U.S. EPA. AP-42, Section 3.3 - Stationary Internal Combustion Engines, 10/96.
U.S. EPA. AP-42, Section 3.4 - Large Stationary Diesel and All Stationary Dual-fuel Engines, 10/96.

Table 14
Potential Emissions
Diesel Storage Tanks (IES-TK-1 through IES-TK-4)
Enviva Pellets Northampton, LLC

Source ID	Description	Design Volume[1]	Working Volume[2]	Tank Dimensions[5]		Orientation	Throughput[3]	Turnovers	VOC Emissions[4]	
				Diameter	Height/ Length					
		(gal)	(gal)	(ft)	(ft)		(gal/yr)		(lb/hr)	(tpy)
IES-TK-1	Emergency Generator #1 Fuel Storage Tank[2]	2,500	1,250	6.0	12	Horizontal	8,803	7.0	1.3E-04	5.8E-04
IES-TK-2	Fire Pump Fuel Storage Tank[2]	500	250	3.0	10.0	Horizontal	7,554	30.2	3.7E-05	1.6E-04
IES-TK-3	Mobile Fuel Diesel Storage Tank	5,000	2,500	6.0	23.7	Horizontal	200,000	80.0	7.6E-04	3.3E-03
IES-TK-4	Emergency Generator #2 Fuel Storage Tank[2]	1,000	500	5.3	6.0	Horizontal	15,958	31.9	1.3E-04	5.8E-04
								Total Emissions:	**1.1E-03**	**4.6E-03**

Notes:

1. Conservative design specifications.
2. Working volume conservatively assumed to be 50% of tank design volume because tanks will not be full at all times.
3. Throughput for IES-TK-1, IES-TK-2, and IES-TK-4 based on fuel consumption provided by Enviva and 500 hours of operation per year. Throughput for IES-TK-3 provided by Enviva.
4. Emissions calculated using EPA TANKS 4.0 software. A minimum tank length for the TANKS program of 5 feet was used to estimate the emissions for IES-TK-2.
5. IES-TK-3 length was estimated based on the capacity of the tank and the diameter.

Abbreviations:

EPA - Environmental Protection Agency
ft - feet
gal - gallon
lb - pound
yr - year
VOC - volatile organic compound

Table 15a
Haul Road Emissions
Potential Fugitive PM Emissions from Paved Roads
Enviva Pellets Northampton, LLC

Vehicle Activity	Distance Traveled per Roundtrip[1] (ft)	Trips Per Day[1]	Daily VMT	Events Per Year (days)	Empty Truck Weight (lb)	Loaded Truck Weight (lb)	Average Truck Weight (ton)	Annual VMT	PM Emission Factor[2] (lb/VMT)	PM_{10} Emission Factor[2] (lb/VMT)	$PM_{2.5}$ Emission Factor[2] (lb/VMT)	Potential PM Emissions[3]		Potential PM_{10} Emissions[3]		Potential $PM_{2.5}$ Emissions[3]	
												(lb/day)	(tpy)	(lb/day)	(tpy)	(lb/day)	(tpy)
Bark Delivery - Dumper	2,800	11	6	365	41,000	81,000	30.5	2,134	2.24	0.45	0.11	1.31	0.24	0.26	0.05	0.06	0.01
Bark Delivery - Self Unload	3,730	11	8	365	41,000	81,000	30.5	2,842	2.24	0.45	0.11	1.74	0.32	0.35	0.06	0.09	0.02
Log Delivery to Crane Storage Area	2,800	93	49	365	40,400	85,400	31.5	18,004	2.31	0.46	0.11	11.39	2.08	2.28	0.42	0.56	0.10
Log Delivery to Log Storage Area	2,800	93	49	365	40,400	85,400	31.5	18,004	2.31	0.46	0.11	11.39	2.08	2.28	0.42	0.56	0.10
Purchased Chip Delivery	2,800	114	61	365	41,000	91,000	33.0	22,095	2.42	0.48	0.12	14.68	2.68	2.94	0.54	0.72	0.13
Additive Delivery	2,000	0.26	0.1	365	41,000	91,000	33.0	36	2.42	0.48	0.12	0.02	0.004	0.005	0.001	0.001	0.0002
Pellet Truck Delivery to Pellet Loadout Area (Normal Operations)	3,730	86	61	365	41,000	91,000	33.0	22,182	2.42	0.48	0.12	14.73	2.69	2.95	0.54	0.72	0.13
Dry Shavings	3,730	32	23	365	41,000	77,000	29.5	8,251	2.16	0.43	0.11	4.89	0.89	0.98	0.18	0.24	0.04
Contractor Vehicle	2,000	18	7	365	4,000	4,000	2.0	2,462	0.14	0.03	0.01	0.09	0.02	0.02	0.003	0.005	0.001
Employee Car Parking	2,000	68	26	365	4,000	4,000	2.0	9,470	0.14	0.03	6.8E-03	0.36	0.07	0.07	0.013	0.018	0.003
											Total Emissions:	**60.60**	**11.06**	**12.12**	**2.21**	**2.97**	**0.54**

Notes:

1. Distance traveled per round trip and daily trip counts were provided by Enviva.

2. Emission factors calculated based on Equation 2 from AP-42 Section 13.2.1 - Paved Roads, 01/11.

where:

E = emission factor (lb/ton)		
k = particle size multiplier (dimensionless) for PM	0.011	
k = particle size multiplier (dimensionless) for PM_{10}	0.0022	
k = particle size multiplier (dimensionless) for $PM_{2.5}$	0.00054	
sL - mean road surface silt loading from AP-42 Table 13.2.1-3 for quarries (g/m^2)	8.2	
P - No. days with rainfall greater than 0.01 inch	120	Per AP-42, Section 13.2.1, Figure 13.2.1-2 (Northampton County, NC).

3. Potential emissions calculated from appropriate emission factor times vehicle miles traveled with control efficiency of 90% for water / dust suppression activities followed by sweeping. Per Table 5 in Chapter 4 of the Air Pollution Engineering Manual, Air and Waste Management Association, page 141. Control efficiency (%) = 96-0.263*V, where V is the number of vehicle passes since application of water.

Abbreviations:

ft - feet
g - gram
hr - hour
lb - pound
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
tpy - tons per year
yr - year
VMT - vehicle miles traveled
VOC - volatile organic compound

References:

U.S. EPA. AP-42, Section 13.2.1 - Paved Roads, 01/11.

Table 15b
Haul Road Emissions
Potential Fugitive PM Emissions from Unpaved Roads
Enviva Pellets Northampton, LLC

Vehicle Activity	Distance Traveled per Roundtrip[1] (ft)	Trips Per Day[1]	Daily VMT	Events Per Year (days)	Empty Truck Weight (lb)	Loaded Truck Weight (lb)	Average Truck Weight (ton)	Annual VMT
Log Delivery to Crane Storage Area	2,000	93	35	365	40,400	85,400	31.5	12,860
Log Delivery to Log Storage Area	2,000	93	35	365	40,400	85,400	31.5	12,860
Purchased Chip Delivery	7,000	114	151	365	41,000	91,000	33.0	55,238
Bark Delivery - Dumper	7,000	11	15	365	41,000	81,000	30.5	5,334
Additive Delivery	500	0.26	0.02	365	41,000	91,000	33.0	9
							32.4	**86,300**

Notes:

1. Distance traveled per round trip and daily trip counts were provided by Enviva.

Emission Calculations Unpaved Roads:

Pollutant	Emperical Constant (k)[1]	Silt Content (S)[2]	Particle Constant a[1]	Particle Constant b[1]	Emission Factor[3]	Potential Emissions[4]
	(lb/VMT)	(%)	(-)	(-)	(lb/VMT)	(tpy)
PM	4.9	8.4	0.7	0.45	7.47	32.25
PM_{10}	1.5	8.4	0.9	0.45	2.13	9.19
$PM_{2.5}$	0.15	8.4	0.9	0.45	0.21	0.92

Notes:

1. Constants (k, a, & b) based on AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-2 for Industrial Roads, November 2006
2. Silt loading factor based on AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1, Lumber Sawmills, November 2006
3. Emission factors calculated based on Equation 1a from AP-42 Section 13.2.2 - Unpaved Roads, 11/06.

Particulate Emission Factor: $E_{ext} = k (s/12)^a \times (W/3)^b * (365-P/365)$

k = particle size multiplier for particle size range and units of interest
E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
P=number of days with at least 0.01 in of precipitation during the averaging period =
= 120 Per AP-42, Section 13.2.1, Figure 13.2.1-2 (Northampton, VA).

4. Potential emissions calculated from appropriate emission factor times vehicle miles traveled with control efficiency of 90% for water / dust suppression activities.

Abbreviations:

ft - feet
hr - hour
lb - pound
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
tpy - tons per year
yr - year
VMT - vehicle miles traveled
VOC - volatile organic compound

References:

U.S. EPA. AP-42, Section 13.2.2 - Unpaved Roads, 11/06.

Table 16
Potential GHG Emissions
Facility-wide
Enviva Pellets Northampton, LLC

Operating Data:

Dryer-1 Heat Input	175.3	MMBtu/hr
Annual Heat Input	1,554,814	MMBtu/yr
Duct Burner 1 and 2 Heat Input	3	MMBtu/hr
Number of Burners	2	
Operating Schedule	8,760	hrs/yr
Dryer-2 Heat Input	180.0	MMBtu/hr
Annual Heat Input	1,576,800	MMBtu/yr
Duct Burner 3 and 4 Heat Input	3	MMBtu/hr
Number of Burners	2	
Operating Schedule	8,760	hrs/yr
RTO-1 Heat Input	31.6	MMBtu/hr
Operating Schedule	8,760	hrs/yr
Furnace 1 Bypass Heat Input	26	MMBtu/hr
Operating Schedule	50	hrs/yr
Furnace 1 Idle Heat Input	10	MMBtu/hr
Operating Schedule	500	hrs/yr
RTO-2 Heat Input	28.8	MMBtu/hr
Operating Schedule	8,760	hrs/yr
Furnace 2 Bypass Heat Input	27	MMBtu/hr
Operating Schedule	50	hrs/yr
Furnace 2 Idle Heat Input	10	MMBtu/hr
Operating Schedule	500	hrs/yr
RCO-2 Heat Input	16.2	MMBtu/hr
Operating Schedule	8,760	hrs/yr
Propane Vaporizer Heat Input	1	MMBtu/hr
Operating Schedule	8,760	hrs/yr
Emergency Generator 1 Output	350	bhp
Operating Schedule	500	hrs/yr
Power Conversion	7,000	Btu/hr/hp
Energy Input	2.450	MMBtu/hr
Emergency Generator 2 Output	671	bhp
Operating Schedule	500	hrs/yr
Power Conversion	7,000	Btu/hr/hp
Energy Input	4.69	MMBtu/hr
Fire Water Pump Output	300	bhp
Operating Schedule	500	hrs/yr
Power Conversion	7,000	Btu/hr/hp
Energy Input	2.100	MMBtu/hr

Table 16
Potential GHG Emissions
Facility-wide
Enviva Pellets Northampton, LLC

Emission Unit ID	Fuel Type	Emission Factors from Table C-1 (kg/MMBtu)[1]			Tier 1 Emissions (short tons)			
		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	Total CO_2e
ES-DRYER-1	Wood and Wood Residuals	93.80	1.80E-01	1.07E+00	160,761	308	1,839	162,908
IES-DDB-1 and -2	Propane	62.87	7.50E-02	1.79E-01	3,035	3.62	8.63	3,048
ES-DRYER-2	Wood and Wood Residuals	93.80	1.80E-01	1.07E+00	163,034	313	1,865	165,212
IES-DDB-3 and -4	Propane	62.87	7.50E-02	1.79E-01	3,035	3.62	8.63	3,048
CD-RTO-1[2]	Propane	62.87	7.50E-02	1.79E-01	19,202	22.91	54.61	19,280
ES-FURNACEBYP-1	Wood and Wood Residuals	93.80	1.80E-01	1.07E+00	136	0.26	1.55	138
ES-FURNACEBYP-1 (Idle Mode)	Wood and Wood Residuals	93.80	1.80E-01	1.07E+00	517	0.99	5.91	524
CD-RTO-2[3]	Propane	62.87	7.50E-02	1.79E-01	17,489	20.86	49.74	17,560
ES-FURNACEBYP-2	Wood and Wood Residuals	93.80	1.80E-01	1.07E+00	140	0.27	1.60	141
ES-FURNACEBYP-2 (Idle Mode)	Wood and Wood Residuals	93.80	1.80E-01	1.07E+00	517	0.99	5.91	524
CD-RCO-2[4]	Propane	62.87	7.50E-02	1.79E-01	9,812	11.71	27.91	9,852
IES-PVAP	Propane	62.87	7.50E-02	1.79E-01	607.08	0.72	1.73	610
IES-GN-1	No. 2 Fuel Oil (Distillate)	73.96	7.50E-02	1.79E-01	100	0.10	0.24	100
IES-GN-2	No. 2 Fuel Oil (Distillate)	73.96	7.50E-02	1.79E-01	191	0.19	0.46	192
IES-FWP	No. 2 Fuel Oil (Distillate)	73.96	7.50E-02	1.79E-01	86	0.09	0.21	86

Notes:

[1] Emission factors from Table C-1 and C-2 of GHG Reporting Rule. Emission factors for methane and N_2O already multiplied by their respective GWPs of 25 and 298.

[2] CD-RTO-1 heat input includes heat input contributed by VOC in the furnace/dryer, green hammermill, dry hammermill, and dry shavings hammermills' exhaust streams in addition to the RTO burners.

[3] CD-RTO-2 heat input includes heat input contributed by VOC in the furnace/dryer exhaust stream in addition to the RTO burners.

[4] CD-RCO-2 heat input includes the heat input contributed by VOC in the pellet cooler exhaust stream in addition to the RCO/RTO burners.

APPENDIX D
PERMIT APPLICATION FORMS

FORM A

GENERAL FACILITY INFORMATION

REVISED 09/22/16 — NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate — **A**

NOTE- APPLICATION WILL NOT BE PROCESSED WITHOUT THE FOLLOWING:

☐	Local Zoning Consistency Determination (new or modification only)	☑	Appropriate Number of Copies of Application	**Application Fee** (please check one option below)
☑	Responsible Official/Authorized Contact Signature	☑	P.E. Seal (if required)	☑ Not Required ☐ ePayment ☐ Check Enclosed

GENERAL INFORMATION

Legal Corporate/Owner Name:	**Enviva Pellets Northampton, LLC**
Site Name:	**Enviva Pellets Northampton, LLC**
Site Address (911 Address) Line 1:	**309 Enviva Blvd.**
Site Address Line 2:	
City: **Garysburg**	State: **North Carolina**
Zip Code: **27839**	County: **Northampton**

CONTACT INFORMATION

Responsible Official/Authorized Contact:		***Invoice Contact:***	
Name/Title:	**Roland Burnett, Plant Manager**	Name/Title:	**Emily Huegel, Environmental Health & Safety Manager**
Mailing Address Line 1:	**309 Enviva Blvd.**	Mailing Address Line 1:	**309 Enviva Blvd.**
Mailing Address Line 2:		Mailing Address Line 2:	
City: **Garysburg** State: **NC** Zip Code:	**27839**	City: **Garysburg** State: **NC** Zip Code:	**27839**
Primary Phone No.:	**(252) 541-2631 ext 101**	Primary Phone No.:	**(919) 971-2054**
Fax No.:		Fax No.:	
Secondary Phone No.:		Secondary Phone No.:	
Email Address:	**Roland.Burnett@envivabiomass.com**	Email Address:	**emily.huegel@envivabiomass.com**

Facility/Inspection Contact:		***Permit/Technical Contact:***	
Name/Title:	**Emily Huegel, Environmental Health & Safety Manager**	Name/Title:	**Emily Huegel, Environmental Health & Safety Manager**
Mailing Address Line 1:	**309 Enviva Blvd.**	Mailing Address Line 1:	**309 Enviva Blvd.**
Mailing Address Line 2:		Mailing Address Line 2:	
City: **Garysburg** State: **NC** Zip Code:	**27839**	City: **Garysburg** State: **NC** Zip Code:	**27839**
Primary Phone No.:	**(919) 971-2054**	Primary Phone No.:	**(919) 971-2054**
Fax No.:		Fax No.:	
Secondary Phone No.:		Secondary Phone No.:	
Email Address:	**emily.huegel@envivabiomass.com**	Email Address:	**emily.huegel@envivabiomass.com**

APPLICATION IS BEING MADE FOR

☐ New Non-permitted Facility/Greenfield ☑ Modification of Facility (permitted) ☐ Renewal Title V ☐ Renewal Non-Title V
☐ Name Change ☐ Ownership Change ☐ Administrative Amendment ☐ Renewal with Modification

FACILITY CLASSIFICATION AFTER APPLICATION (Check Only One)

General ☐ Small ☐ Prohibitory Small ☐ Synthetic Minor ☑ Title V

FACILITY (Plant Site) INFORMATION

Describe nature of (plant site) operation(s):
Wood pellet manufacturing facility

Facility ID No. **6600167**

Primary SIC/NAICS Code: **2499 (Wood Products, not elsewhere classified)** — Current/Previous Air Permit No. **10203R06** — Expiration Date: **February 28, 2025**

Facility Coordinates: Latitude: **36.5025** Longitude: **-77.6135**

Does this application contain confidential data? ☐ YES ☑ NO — ***If yes, please contact the DAQ Regional Office prior to submitting this application.*** **(See Instructions)**

PERSON OR FIRM THAT PREPARED APPLICATION

Person Name:	**Michael Carbon**	Firm Name:	**Ramboll US Corporation**
Mailing Address Line 1:	**8235 YMCA Plaza Drive, Suite 300**	Mailing Address Line 2:	
City: **Baton Rouge**	State: **LA**	Zip Code: **70810**	County:
Phone No.: **(225) 408-2691**	Fax No.:	Email Address:	**mcarbon@ramboll.com**

SIGNATURE OF RESPONSIBLE OFFICIAL/AUTHORIZED CONTACT

Name (typed): Roland Burnett — Title: Plant Manager

X Signature(Blue Ink): Roland Burnett — Date: 11-18-2020

Attach Additional Sheets As Necessary

FORMs A2, A3

EMISSION SOURCE LISTING FOR THIS APPLICATION - A2

112r APPLICABILITY INFORMATION - A3

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **A2**

EMISSION SOURCE LISTING: New, Modified, Previously Unpermitted, Replaced, Deleted

EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	CONTROL DEVICE ID NO.	CONTROL DEVICE DESCRIPTION
Equipment To Be ADDED By This Application (New, Previously Unpermitted, or Replacement)			
Existing Permitted Equipment To Be MODIFIED By This Application			
Equipment To Be DELETED By This Application			

112(r) APPLICABILITY INFORMATION — A 3

Is your facility subject to 40 CFR Part 68 "Prevention of Accidental Releases" - Section 112(r) of the Federal Clean Air Act? ☐ Yes ☑ No

If No, please specify in detail how your facility avoided applicability: **Enviva Pellets Northampton, LLC will not store or use any of the substances subject to Section 112(r) of the Federal Clean Air Act above the threshold quantity.**

If your facility is Subject to 112(r), please complete the following:

A. Have you already submitted a Risk Management Plan (RMP) to EPA Pursuant to 40 CFR Part 68.10 or Part 68.150?

☐ Yes ☐ No Specify required RMP submittal date: _____ If submitted, RMP submittal date: _____

B. Are you using administrative controls to subject your facility to a lesser 112(r) program standard?

☐ Yes ☐ No If yes, please specify: _____

C. List the processes subject to 112(r) at your facility:

PROCESS DESCRIPTION	PROCESS LEVEL (1, 2, or 3)	HAZARDOUS CHEMICAL	MAXIMUM INTENDED INVENTORY (LBS)

Attach Additional Sheets As Necessary

FORM D1

FACILITY-WIDE EMISSIONS SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D1**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

	EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (AFTER CONTROLS / LIMITATIONS)
AIR POLLUTANT EMITTED	tons/yr	tons/yr	tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**		
PARTICULATE MATTER < 10 MICRONS (PM_{10})			
PARTICULATE MATTER < 2.5 MICRONS ($PM_{2.5}$)			
SULFUR DIOXIDE (SO_2)			
NITROGEN OXIDES (NOx)			
CARBON MONOXIDE (CO)			
VOLATILE ORGANIC COMPOUNDS (VOC)			
LEAD			
GREENHOUSE GASES (GHG) (SHORT TONS)			
OTHER			

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

		EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (BEFORE CONTROLS / LIMITATIONS)	**POTENTIAL EMISSIONS** (AFTER CONTROLS / LIMITATIONS)
HAZARDOUS AIR POLLUTANT EMITTED	CAS NO.	tons/yr	tons/yr	tons/yr
		See Emission Calculations in Appendix C		

TOXIC AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

INDICATE REQUESTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS. EMISSIONS ABOVE THE TOXIC PERMIT EMISSION RATE (TPER) IN 15A NCAC 2Q .0711 MAY REQUIRE AIR DISPERSION MODELING. USE NETTING FORM D2 IF NECESSARY.

					Modeling Required ?	
TOXIC AIR POLLUTANT EMITTED	CAS NO.	lb/hr	lb/day	lb/year	Yes	No
		See Emission Calculations in Appendix C				

COMMENTS:

Attach Additional Sheets As Necessary

FORM D4

EXEMPT AND INSIGNIFICANT ACTIVITIES SUMMARY

ACTIVITIES EXEMPTED PER 2Q .0102 OR

INSIGNIFICANT ACTIVITIES PER 2Q .0503 FOR TITLE V SOURCES

	DESCRIPTION OF EMISSION SOURCE	SIZE OR PRODUCTION RATE	BASIS FOR EXEMPTION OR INSIGNIFICANT ACTIVITY
1	Bark Hog IES-BARK	234,377 ODT/yr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
2.	Diesel Storage Tank for Emergency Generator #1 IES-TK-1	2,500 gallons	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
3.	Diesel Storage Tank for Fire Water Pump IES-TK-2	500 gallons	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
4.	Mobile Fuel Diesel Storage Tank IES-TK-3	5,000 gallons	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
5.	Diesel Storage Tank for Emergency Generator #2 IES-TK-4	1,000 gallons	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
6.	Debarker IES-DEBARK	781,255 ODT/yr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
7.	Green Wood Fuel Bin IES-GWFB	13.93 ODT/hr	15A NCAC 02Q .0503(8)-no quantifiable emissions
8.	Dry Line Hopper IES-DLH	10 ton/hr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
9.	Dry Shaving Material Handling and Storage IES-DRYSHAVE	Varies	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
10.	Electric Powered Green Wood Chipper IES-EPWC	781,255 ODT/yr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
11.	Additive Handling and Storage IES-ADD	8,760 ODT/yr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
12.	Emergency Generator 1 IES-GN-1	350 bhp	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
13.	Emergency Generator-2 IES-GN-2	671 bhp	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
14.	Fire water Pump IES-FWP	300 bhp	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
15.	Dryer #1 Double Duct Burners IES-DDB-1 and IES-DDB-2	2.5 MMBtu/hr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
16.	Dryer #2 Double Duct Burners IES-DDB-3 and IES-DDB-4	2.5 MMBtu/hr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C
17.	Propane Vaporizer IES-PVAP	1 MMBtu/hr	15A NCAC 02Q .0503(8)-low emissions, see Appendix C

Attach Additional Sheets As Necessary

FORM D5

TECHNICAL ANALYSIS TO SUPPORT PERMIT APPLICATION

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D5**

PROVIDE DETAILED TECHNICAL CALCULATIONS TO SUPPORT ALL EMISSION, CONTROL, AND REGULATORY DEMONSTRATIONS MADE IN THIS APPLICATION. INCLUDE A COMPREHENSIVE PROCESS FLOW DIAGRAM AS NECESSARY TO SUPPORT AND CLARIFY CALCULATIONS AND ASSUMPTIONS. ADDRESS THE FOLLOWING SPECIFIC ISSUES ON SEPARATE PAGES:

A **SPECIFIC EMISSIONS SOURCE (EMISSION INFORMATION) (FORM B and B1 through B9)** - SHOW CALCULATIONS USED, INCLUDING EMISSION FACTORS, MATERIAL BALANCES, AND/OR OTHER METHODS FROM WHICH THE POLLUTANT EMISSION RATES IN THIS APPLICATION WERE DERIVED. INCLUDE CALCULATION OF POTENTIAL BEFORE AND, WHERE APPLICABLE, AFTER CONTROLS. CLEARLY STATE ANY ASSUMPTIONS MADE AND PROVIDE ANY REFERENCES AS NEEDED TO SUPPORT MATERIAL BALANCE CALCULATIONS.

B **SPECIFIC EMISSION SOURCE (REGULATORY INFORMATION)(FORM E2 - TITLE V ONLY)** - PROVIDE AN ANALYSIS OF ANY REGULATIONS APPLICABLE TO INDIVIDUAL SOURCES AND THE FACILITY AS A WHOLE. INCLUDE A DISCUSSION OUTING METHODS (e.g. FOR TESTING AND/OR MONITORING REQUIREMENTS) FOR COMPLYING WITH APPLICABLE REGULATIONS, PARTICULARLY THOSE REGULATIONS LIMITING EMISSIONS BASED ON PROCESS RATES OR OTHER OPERATIONAL PARAMETERS. PROVIDE JUSTIFICATION FOR AVOIDANCE OF ANY FEDERAL REGULATIONS (PREVENTION OF SIGNIFICANT DETERIORATION (PSD), NEW SOURCE PERFORMANCE STANDARDS (NSPS), NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS), TITLE V), INCLUDING EXEMPTIONS FROM THE FEDERAL REGULATIONS WHICH WOULD OTHERWISE BE APPLICABLE TO THIS FACILITY. SUBMIT ANY REQUIRED INFORMATION TO DOCUMENT COMPLIANCE WITH ANY REGULATIONS. INCLUDE EMISSION RATES CALCULATED IN ITEM "A" ABOVE, DATES OF MANUFACTURE, CONTROL EQUIPMENT, ETC. TO SUPPORT THESE CALCULATIONS.

C **CONTROL DEVICE ANALYSIS (FORM C and C1 through C9)** - PROVIDE A TECHNICAL EVALUATION WITH SUPPORTING REFERENCES FOR ANY CONTROL EFFICIENCIES LISTED ON SECTION C FORMS, OR USED TO REDUCE EMISSION RATES IN CALCULATIONS UNDER ITEM "A" ABOVE. INCLUDE PERTINENT OPERATING PARAMETERS (e.g. OPERATING CONDITIONS, MANUFACTURING RECOMMENDATIONS, AND PARAMETERS AS APPLIED FOR IN THIS APPLICATION) CRITICAL TO ENSURING PROPER PERFORMANCE OF THE CONTROL DEVICES). INCLUDE AND LIMITATIONS OR MALFUNCTION POTENTIAL FOR THE PARTICULAR CONTROL DEVICES AS EMPLOYED AT THIS FACILITY. DETAIL PROCEDURES FOR ASSURING PROPER OPERATION OF THE CONTROL DEVICE INCLUDING MONITORING SYSTEMS AND MAINTENANCE TO BE PERFORMED.

D **PROCESS AND OPERATIONAL COMPLIANCE ANALYSIS - (FORM E3 - TITLE V ONLY)** - SHOWING HOW COMPLIANCE WILL BE ACHIEVED WHEN USING PROCESS, OPERATIONAL, OR OTHER DATA TO DEMONSTRATE COMPLIANCE. REFER TO COMPLIANCE REQUIREMENTS IN THE REGULATORY ANALYSIS IN ITEM "B" WHERE APPROPRIATE. LIST ANY CONDITIONS OR PARAMETERS THAT CAN BE MONITORED AND REPORTED TO DEMONSTRATE COMPLIANCE WITH THE APPLICABLE REGULATIONS.

E **PROFESSIONAL ENGINEERING SEAL** - PURSUANT TO 15A NCAC 2Q .0112 "APPLICATION REQUIRING A PROFESSIONAL ENGINEERING SEAL," A PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA SHALL BE REQUIRED TO SEAL TECHNICAL PORTIONS OF THIS APPLICATION FOR NEW SOURCES AND MODIFICATIONS OF EXISTING SOURCES. (SEE INSTRUCTIONS FOR FURTHER APPLICABILITY).

I, **Russell Kemp** *attest that this application for* **Enviva Pellets Northampton, LLC** *has been reviewed by me and is accurate, complete and consistent with the information supplied in the engineering plans, calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the proposed design has been prepared in accordance with the applicable regulations. Although certain portions of this submittal package may have been developed by other professionals, inclusion of these materials under my seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design. Note: In accordance with NC General Statutes 143-215.6A and 143-215.6B, any person who knowingly makes any false statement, representation, or certification in any application shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed $10,000 as well as civil penalties up to $25,000 per violation.*

(PLEASE USE BLUE INK TO COMPLETE THE FOLLOWING)

NAME: **Russell Kemp, MS, PE**

DATE: 12 NOVEMBER 2020

COMPANY: **REUS Engineers, P.C.**

ADDRESS: **1600 Parkwood Circle, Suite 310, Atlanta, GA 30339**

TELEPHONE: **(678) 388-1654**

SIGNATURE:

PAGES CERTIFIED: **Forms B, B1, B6, B9, C1, C2, C3, C4**

Appendix C with emission calculations

Application Narrative

(IDENTIFY ABOVE EACH PERMIT FORM AND ATTACHMENT THAT IS BEING CERTIFIED BY THIS SEAL)

PLACE NORTH CAROLINA SEAL HERE

Attach Additional Sheets As Necessary

FORM E1

TITLE V GENERAL INFORMATION

IF YOUR FACILITY IS CLASSIFIED AS "MAJOR" FOR TITLE V YOU MUST COMPLETE THIS FORM AND ALL OTHER REQUIRED "E" FORMS (E2 THROUGH E5 AS APPLICABLE)

Indicate here if your facility is subject to Title V by: ☑ EMISSIONS ☐ OTHER

If subject to Title V by "OTHER", specify why: ☐ NSPS ☐ NESHAP (MACT) ☐ TITLE IV ☐ OTHER (specify) _____

If you are or will be subject to any maximum achievable control technology standards (MACT) issued pursuant to section 112(d) of the Clean Air Act, specify below:

EMISSION SOURCE ID	*EMISSION SOURCE DESCRIPTION*	*MACT*
IES-GN-1, IES-GN-2	Emergency Generator 1 and 2	Subpart ZZZZ
IES-FWP	Fire Water Pump	Subpart ZZZZ

List any additional regulation which are requested to be included in the shield and provide a detailed explanation as to why the shield should be granted:

REGULATION	*EMISSION SOURCE (Include ID)*	*EXPLANATION*

Comments:

Attach Additional Sheets As Necessary

FORM E2

EMISSION SOURCE APPLICABLE REGULATION LISTING

EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	OPERATING SCENARIO INDICATE PRIMARY (P) OR ALTERNATIVE (A)	POLLUTANT	APPLICABLE REGULATION
See attached table following this form for a summary of regulatory requirements and associated compliance requirements				

Attach Additional Sheets As Necessary

Summary of Regulatory Requirements and Associated Compliance Requirements
Enviva Pellets Northampton, LLC

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Dryers #1 and #2, Green Hammermills 1 through 5, Dry Shavings Hammermills 1 and 2, Dry Hammermills 1 through 8	ES-DRYER-1, ES-DRYER-2, ES-GHM-1 to ES-GHM-5, ES-DSHM-1, ES-DSHM-2, ES-HM-1 to ES-HM-8	PM	15A NCAC 02D .0515	RTO	Daily monitoring of WESP secondary voltage and current. Inspections and maintenance as recommended by the control device manufacturers, as well as monthly visual inspection of the ductwork and material collection units. Annual inspections of WESP including, but not limited to, visual check of critical components, checks for any equipment that does not alarm when de-energized, checks for signs of plugging in the hopper and gas distribution equipment, and replacement of broken equipment as required. Annual inspection of the heat transfer medium and associated inlet/outlet valves on the RTO. Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	Written or electronic log of WESP secondary voltage and current, date/time/result of inspections and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the WESP or RTO within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		VOC, CO, NO_X, $PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0317		Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ). Maintain 3-hour block average temperature across all fireboxes comprising the RTO at or above the minimum average temperature established in the most recent performance test. Daily monitoring of minimum secondary voltage and secondary current for the WESP. Limit throughput to 781,255 ODT with a maximum of 80% softwood per consecutive 12-month period. Perform required inspections and maintenance for the WESP and RTO (see above).	Written or electronic log of monthly throughput, hardwood/softwood mix, actual emissions (facility-wide 12-month rolling basis), 3-hour block average temperature for the RTO, daily WESP secondary voltage and current, date/time/result of inspections and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the WESP or RTO within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements. Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		SO_2	15A NCAC 02D .0516		None required because inherently low sulfur content of wood fuel ensures compliance.		
		HAP	15A NCAC 02Q .0308(a)		Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	N/A	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4).
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity. If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.

Summary of Regulatory Requirements and Associated Compliance Requirements
Enviva Pellets Northampton, LLC

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Pellet Mill Feed Silo	ES-PMFS	PM	15A NCAC 02D .0515	Baghouse	Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of control device structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit results of any maintenance performed on the control device within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		$PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0308(a)		Monthly actuals emissions.	Written or electronic log of actual emissions (facility-wide 12-month rolling basis).	Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity. If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Finished Product Handling, Twelve Pellet Loadout Bins, Pellet Loadout 1 and 2	ES-FPH, ES-PB-1 to ES-PB-12, ES-PL-1, ES-PL-2	PM	15A NCAC 02D .0515	Baghouse	Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of baghouse structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit results of any maintenance performed on the baghouse within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		$PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0308(a)		Monthly actuals emissions.	Written or electronic log of actual emissions (facility-wide 12-month rolling basis).	Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity. If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.

Summary of Regulatory Requirements and Associated Compliance Requirements
Enviva Pellets Northampton, LLC

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Pellet Coolers 1 through 6	ES-CLR-1 to ES-CLR-6	PM	15A NCAC 02D .0515	RTO/RCO	Inspections and maintenance as recommended by the RTO/RCO manufacturer, as well as monthly visual inspection of the ductwork and material collection units. Annual inspection of the heat transfer medium and associated inlet/outlet valves on the RTO/RCO. Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	Written or electronic log of date/time/result of inspections and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the RTO/RCO within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		VOC, CO, NO_X, $PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0317		Initial and periodic stack testing for VOC and $PM/PM_{10}/PM_{2.5}$ (at least annually unless a longer duration is approved by DAQ). Limit pellet production to 781,255 ODT with a maximum of 80% softwood per consecutive 12-month period. Maintain 3-hour block average temperature across all fireboxes comprising the RTO/RCO at or above the minimum average temperature established in the most recent performance test. At a minimum, perform annual internal inspection of the heat transfer medium and associated inlet/outlet valves on the RTO/RCO. Develop a written malfunction plan for the RTO/RCO temperature monitoring and recording system. Perform periodic catalyst activity checks as recommended by the manufacturer.	Written or electronic log of monthly throughput, hardwood/softwood mix, and actual emissions (facility-wide 12-month rolling basis). Written or electronic log of 3-hour block average temperature for the RTO/RCO, date/time/result of inspections and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made. Develop and maintain a malfunction plan for the temperature monitoring and recording system that describes, in detail, the operating procedures for periods of malfunctions.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the cyclones and RTO/RCO within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements. Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		HAP	15A NCAC 02Q .0308(a)		Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	N/A	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4).
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.

Summary of Regulatory Requirements and Associated Compliance Requirements
Enviva Pellets Northampton, LLC

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Pellet Cooler HP Fines Relay System	ES-PCHP	PM	15A NCAC 02D .0515	Baghouse	Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of baghouse structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit results of any maintenance performed on the baghouse within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		$PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0308(a)		Monthly actuals emissions.	Written or electronic log of actual emissions (facility-wide 12-month rolling basis).	Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity. If above normal, correct action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Emergency Generators	IES-GN-1 and IES-GN-2	PM, CO, NO_x, NMHC, SO_2	40 CFR Part 60 Subpart IIII	N/A	All requirements are outlined in the regulation, including the following: use certified emergency engines, operate according to manufacturers procedures, use fuel oil with fuel content of no more than 15 ppmw sulfur and cetane index of at least 40, install non-resettable hour meter.	Maintain records of engine certification, fuel certifications and hours/year of operation of each engine.	N/A
		SO_2	15A NCAC 02D .0516	N/A	Non required because inherently low sulfur content of fuel achieves compliance.		
		Opacity	15A NCAC 02D .0521	N/A	Monthly visible observation for "normal" opacity during operation (only applicable if equipment is operated). If above normal, correct action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	N/A
		HAPs	40 CFR Part 63 Subpart ZZZZ	N/A	Comply with the NSPS requirements. No other requirements apply.	Comply with the NSPS requirements. No other requirements apply.	N/A
Fire Water Pump	IES-FWP	PM, CO, NO_x, NMHC, SO_2	40 CFR Part 60 Subpart IIII	N/A	All requirements are outlined in the regulation, including the following: use certified emergency engines, operate according to manufacturers procedures, use fuel oil with fuel content of no more than 15 ppmw sulfur and cetane index of at least 40, install non-resettable hour meter.	Maintain records of engine certification, fuel certifications and hours/year of operation of each engine.	N/A
		SO_2	15A NCAC 02D .0516	N/A	Non required because inherently low sulfur content of fuel achieves compliance.		
		Opacity	15A NCAC 02D .0521	N/A	Monthly visible observation for "normal" opacity during operation (only applicable if equipment is operated). If above normal, correct action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	N/A
		HAPs	40 CFR Part 63 Subpart ZZZZ	N/A	Comply with the NSPS requirements. No other requirements apply.	Comply with the NSPS requirements. No other requirements apply.	N/A

Summary of Regulatory Requirements and Associated Compliance Requirements
Enviva Pellets Northampton, LLC

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Dry Shavings Silo	ES-DSS	PM	15A NCAC 02D .0515	Baghouse	Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of baghouse structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit results of any maintenance performed on the baghouse within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		$PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0308(a)		Monthly actuals emissions.	Written or electronic log of actual emissions (facility-wide 12-month rolling basis).	Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity. If above normal, correct action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Dry Hammermill Prescreeners 1 and 2, Additive Handling and Storage, Dry Line Hopper, Dry Line Feed Conveyor, Dry Shaving Material Handling and Storage, Green Wood Handling and Storage, Electric Powered Green Wood Chipper, Bark Hog, Debarker, Double Duct Burners	ES-PS-1 and -2, IES-ADD, IES-DLH, IES-DLC-1, IES-DRYSHAVE, ES-GWHS, IES-EPWC, IES-BARK, IES-DEBARK, IES-DDB-1 through DDB-4	PM	15A NCAC 02D .0515	N/A	Comply with the process weight limitation.	N/A	N/A
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity during operation for all sources except insignificant activities (only applicable if equipment is operated). If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Dry Wood Handling 1	ES-DWH-1	PM	15A NCAC 02D .0515	Bin Vent Filter	Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of control device structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit results of any maintenance performed on the control device within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		$PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0308(a)		Monthly actuals emissions.	Written or electronic log of actual emissions (facility-wide 12-month rolling basis).	Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity. If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.

Summary of Regulatory Requirements and Associated Compliance Requirements
Enviva Pellets Northampton, LLC

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Dry Wood Handling 2, Dry Shavings Reception	ES-DWH-2, ES-DSR	PM	15A NCAC 02D .0515	Baghouse	Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of baghouse structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit results of any maintenance performed on the baghouse within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		$PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0308(a)		Monthly actuals emissions.	Written or electronic log of actual emissions (facility-wide 12-month rolling basis).	Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity. If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Furnace #1 and #2 Bypass	ES-FURNACEBYP-1, ES-FURNACEBYP-2	PM	15A NCAC 02D .0515	N/A	Comply with the process weight limitation.	N/A	N/A
		VOC, CO, NO_X, $PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0317		Limit hours of furnace bypass to 50 per year for cold start-ups. Limit heat input during cold start-ups to no more than 26.3 MMBtu/hr for Furnace 1 and 27.0 MMBtu/hr for Furnace 2. Limit duration of cold start-ups to 8 hours or less. Limit hours of operation in idle mode to 500 hours per year. Limit heat input during idle to 10 MMBtu/hr.	Written or electronic log of monthly hours of operation in cold start-up and idle mode and actual emissions (facility-wide 12-month rolling basis).	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements. Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal" opacity during operation (only applicable if equipment is operated). If above normal, corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Facility-wide	--	Fugitive Dust	15A NCAC 02D .0540	--	N/A	N/A	N/A
		Odor	15A NCAC 02D .1806		N/A	N/A	N/A

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 09/22/16 **NCDEQ/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

Emission Source ID NO.	Regulated Pollutant
	Applicable Regulation

Alternative Operating Scenario (AOS) NO:

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ YES ☐ NO

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ YES ☐ NO

Describe Monitoring Device Type:

Describe Monitoring Location:

Other Monitoring Methods (Describe In Detail): **CAM applicability and, if applicable, submission of CAM plans, will be addressed as part of future Title V operating permit renewal applications.**

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording:

Frequency of recordkeeping (How often is data recorded?):

REPORTING REQUIREMENTS

Generally describe what is being reported:

Frequency: ☐ MONTHLY ☐ QUARTERLY ☐ EVERY 6 MONTHS ☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method:

Specify reference test method rule and citation:

Specify testing frequency:

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E4
EMISSION SOURCE COMPLIANCE SCHEDULE

COMPLIANCE STATUS WITH RESPECT TO ALL APPLICABLE REQUIREMENTS

Will each emission source at your facility be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements?

☑ YES ☐ NO **If NO**, complete **A** through **F** below for each requirement for which compliance is not achieved.

Will your facility be in compliance with all applicable requirements taking effect during the term of the permit and meet such requirements on a timely basis?

☑ YES ☐ NO **If NO**, complete **A** through **F** below for each requirement for which compliance is not achieved.

If this application is for a modification of existing emissions source(s), is each emission source currently in compliance with all applicable requirements?

☑ YES ☐ NO **If NO**, complete **A** through **F** below for each requirement for which compliance is not achieved.

A. Emission Source Description (Include ID NO.) _____

B. Identify applicable requirement for which compliance is not achieved:

_____

_____

_____

_____

_____

_____

C. Narrative description of how compliance will be achieved with this applicable requirements:

_____

_____

_____

_____

_____

D. Detailed Schedule of Compliance:

Step(s)	Date Expected

E. Frequency for submittal of progress reports (6 month minimum):

_____

F. Starting date of submittal of progress reports: _____

Attach Additional Sheets As Necessary

FORM E5

TITLE V COMPLIANCE CERTIFICATION (Required)

In accordance with the provisions of Title 15A NCAC 2Q .0520 and .0515(b)(4) the responsible company official of:

SITE NAME: Enviva Pellets Northampton, LLC

SITE ADDRESS: 309 Enviva Blvd.

CITY, NC : Garysburg NC

COUNTY: Northampton

PERMIT NUMBER : 10203R06

CERTIFIES THAT (Check the appropriate statement(s):

- [x] The facility is in compliance with all applicable requirements
- [ ] In accordance with the provisions of Title 15A NCAC 2Q .0515(b)(4) the responsible company official certifies that the proposed minor modification meets the criteria for using the procedures set out in 2Q .0515 and requests that these procedures be used to process the permit application.
- [ ] The facility is not currently in compliance with all applicable requirements
  If this box is checked, you must also complete Form E4 "Emission Source Compliance Schedule"

The undersigned certifies under the penalty of law, that all information and statements provided in the application, based on information and belief formed after reasonable inquiry, are true, accurate, and complete.

Roland Burnett **Date:** 11-18-2020

Signature of responsible company official (REQUIRED, USE BLUE INK)

Roland Burnett, Plant Manager

Name, Title of responsible company official (Type or print)

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID N **ES-GWHS**
Green Wood Handling and Storage	CONTROL DEVICE ID NO(S): **None**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-9**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Green wood is delivered to the plant via trucks as either pre-chipped wood or unchipped logs from commercial harvesting for on-site chipping. All transfer points and storage piles are captured by the Green Wood Handling and Storage emission ID (ES-GWHS).

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
MANUFACTURER / MODEL NO.:	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT TO ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

OMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-GWHS**
Green Wood Handling and Storage	CONTROL DEVICE ID NO(S): **None**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-9**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Green wood is delivered to the plant via trucks as either pre-chipped wood or unchipped logs from commercial harvesting for on-site chipping. All transfer points and storage piles are captured by the Green Wood Handling and Storage emission ID (ES-GWHS).

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Green Wood Materials - Material feed conveyance system to dryer burner fuel storage bin	**ton/hr**	**44**	**N/A**
Green Wood Materials - Material feed conveyance system to raw wood chip storage pile	**ton/hr**	**400**	**N/A**
Green Wood Materials - Material feed conveyance system to fuel storage piles	**ton/hr**	**44**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DSR**
Dry Shavings Reception	CONTROL DEVICE ID NO(S): **CD-DSR-BF**
OPERATING SCENARIO 1 OF 1	EMISSION POINT (STACK) ID NO(S): **EP-20**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Purchased dry shavings will be unloaded from trucks into a hopper.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
TBD	**TBD**
MANUFACTURER / MODEL NO.: **TBD**	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT T(☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURCE

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DSR**
Dry Shavings Reception	CONTROL DEVICE ID NO(S): **CD-DSR-BF**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-20**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Purchased dry shavings will be unloaded from trucks into a hopper.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Dry Shavings	**ODT/hr**	**30**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-DSR-BF**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DSR**
EMISSION POINT (STACK) ID NO(S): **EP-20**	POSITION IN SERIES OF CONTROLS NO. **1** OF **1** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

A baghouse will control the transfer of dry shavings from trucks into a hopper.

	PM	PM_{10}	$PM_{2.5}$	
POLLUTANTS COLLECTED:				
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	~99.0 %	~99.0 %	~99.0 %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%		%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	See Emission Calculations in Appendix C			

PRESSURE DROP (IN H_20): MIN: MAX: **TBD** GAUGE? ☑ YES ☐ NO

BULK PARTICLE DENSITY (LB/FT^3): **TBD**	INLET TEMPERATURE (^oF): MIN MAX **TBD**
POLLUTANT LOADING RATE: **0.004** ☐ LB/HR ☑ GR/FT^3	OUTLET TEMPERATURE (^oF): MIN MAX **TBD**
INLET AIR FLOW RATE (ACFM): **2,500**	FILTER OPERATING TEMP (^oF): **N/A**

NO. OF COMPARTMENTS: **TBD**	NO. OF BAGS PER COMPARTMENT: **TBD**	LENGTH OF BAG (IN.): **TBD**
NO. OF CARTRIDGES: **TBD**	FILTER SURFACE AREA PER CARTRIDGE (FT^2): **TBD**	DIAMETER OF BAG (IN.): **TBD**
TOTAL FILTER SURFACE AREA (FT^2): **301**	AIR TO CLOTH RATIO: **TBD**	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☐ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:
The air stream will contain wood dust particles.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: **Dry Shavings Silo**	EMISSION SOURCE ID NO: **ES-DSS**
	CONTROL DEVICE ID NO(S): **CD-DSS-BF**
OPERATING SCENARIO 1 OF 1	EMISSION POINT (STACK) ID NO(S): **EP-10**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Stores dry shavings used in pellet production. PM emissions will be controlled by the Dry Shavings Silo Baghouse (CD-DSS-BF).

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☑ Storage silos/bins (Form B6)	☐ Other (Form B9)

START CONSTRUCTION DATE: **TBD**	DATE MANUFACTURED: **TBD**
MANUFACTURER / MODEL NO.: **TBD**	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DSS**
Dry Shavings Silo	CONTROL DEVICE ID NO(S): **CD-DSS-BF**
OPERATING SCENARIO: 1 OF 1	EMISSION POINT(STACK) ID NO(S): **EP-10**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Stores dry shavings used in pellet production. PM emissions will be controlled by the Dry Shavings Silo Baghouse (CD-DSS-BF).

MATERIAL STORED: **Dry Shavings**				DENSITY OF MATERIAL (LB/FT3): **TBD**		
CAPACITY	CUBIC FEET:			TONS:		
DIMENSIONS (FEET)	HEIGHT:	DIAMETER: **TBD**	***(OR)***	LENGTH:	WIDTH:	HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)	ACTUAL:			MAXIMUM DESIGN CAPACITY:		

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☑ BELT CONVEYOR	☑ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☐ OTHER:

NO. FILL TUBES:

MAXIMUM ACFM:

MATERIAL IS UNLOADED TO:
Dry Shavings Hammermills (ES-DSHM-1 and ES-DSHM-2)

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?
Enclosed Screw Conveyor

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): **TBD**

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): **TBD**

COMMENTS:

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-DSS-BF**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DSS**
EMISSION POINT (STACK) ID NO(S): **EP-10**	POSITION IN SERIES OF CONTROLS NO. **1** OF **1** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
The silo baghouse will control emissions from the dry shavings silo (ES-DSS).

POLLUTANTS COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	**~99.0** %	**~99.0** %	**~99.0** %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN H_20): MIN: MAX: **TBD** GAUGE? ☑ YES ☐ NO	
BULK PARTICLE DENSITY (LB/FT^3): **TBD**	INLET TEMPERATURE (°F): MIN MAX **TBD**
POLLUTANT LOADING RATE: **0.004** ☐ LB/HR ☑ GR/FT^3	OUTLET TEMPERATURE (°F) MIN MAX **TBD**
INLET AIR FLOW RATE (ACFM): **500**	FILTER OPERATING TEMP (°F): **N/A**

NO. OF COMPARTMENTS: **TBD**	NO. OF BAGS PER COMPARTMENT: **TBD**	LENGTH OF BAG (IN.): **TBD**
NO. OF CARTRIDGES: **TBD**	FILTER SURFACE AREA PER CARTRIDGE (FT^2): **TBD**	DIAMETER OF BAG (IN.): **TBD**
TOTAL FILTER SURFACE AREA (FT^2): **TBD**	AIR TO CLOTH RATIO: **TBD**	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☐ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES:

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:
The air stream will contain wood dust particles.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-GHM-1 through ES-GHM-5**
Green Hammermills 1 through 5	CONTROL DEVICE ID NO(S): **CD-WESP-1, CD-RTO-1 , CD-WESP-2 , CD-RTO-2**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1, EP-4**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Green wood chips are processed in the green hammermills. The green hammermills will also have the ability to be routed and controlled by the CD-WESP-2 and CD-RTO-2, once constructed, when the CD-WESP-1 and CD-RTO-1 are shutdown.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
GHM-1, 2: 2013 GHM 3, 4, 5: TBD	**GHM-1, 2: 2013 GHM 3, 4, 5: TBD**
MANUFACTURER / MODEL NO.: **GHM-1, 2: Williams #490 GHM 3, 4, 5: TBD**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr

See Emission Calculations in Appendix C

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr

See Emission Calculations in Appendix C

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURC

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-GHM-1 through ES-GHM-5**
Green Hammermills 1 through 5	CONTROL DEVICE ID NO(S): **CD-WESP-1, CD-RTO-1 , CD-WESP-2 , CD-RTO-2**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1, EP-4**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Green wood chips are processed in the Green Hammermills. The green hammermills will also have the ability to be routed and controlled by the CD-WESP-2 and CD-RTO-2, once constructed, when the CD-WESP-1 and CD-RTO-1 are shutdown.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Green Wood	**ton/hr**	**300**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1(**NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DRYER-1**
Dryer #1	CONTROL DEVICE ID NO(S): **CD-WESP-1, CD-RTO-1**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Green wood is conveyed to a rotary dryer system. Direct contact heat is provided to the system via a 175.3 MMBtu/hr burner system. Air emissions will be controlled utilizing a wet electrostatic precipitator (CD-WESP-1) for particulate removal. VOC and organic-HAP emissions will be controlled by a regenerative thermal oxidizer (CD-RTO-1). A bypass stack following the furnace (ES-FURNACEBYP-1) will be used to exhaust hot gases during startup, shutdown, and idle mode.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☑ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☐ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
2012	**2012**
MANUFACTURER / MODEL NO.: **Buettner 5x26R**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr

See Emission Calculations in Appendix C

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr

See Emission Calculations in Appendix C

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

OMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURC

Attach Additional Sheets As Necessary

FORM B1

EMISSION SOURCE (WOOD, COAL, OIL, GAS, OTHER FUEL-FIRED BURNER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B1**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DRYER-1**
Dryer #1	CONTROL DEVICE ID NO(S): **CD-WESP-1, CD-RTO-1**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1**

DESCRIBE USE: ☑ PROCESS HEAT ☐ SPACE HEAT ☐ ELECTRICAL GENERATION
☐ CONTINUOUS USE ☐ STAND BY/EMERGENCY ☐ OTHER (DESCRIBE): _____

HEATING MECHANISM: ☐ INDIRECT ☑ DIRECT

MAX. FIRING RATE (MMBTU/HOUR): **175.3**

WOOD-FIRED BURNER

WOOD TYPE: ☐ BARK ☐ WOOD/BARK ☑ WET WOOD ☐ DRY WOOD ☐ OTHER (DESCRIBE): _____

PERCENT MOISTURE OF FUEL: **~50%**

☐ UNCONTROLLED ☐ CONTROLLED WITH FLYASH REINJECTION ☑ CONTROLLED W/O REINJECTION

FUEL FEED METHOD: **N/A** HEAT TRANSFER MEDIA: ☐ STEAM ☑ AIR ☐ OTHER (DESCRIBE) _____

COAL-FIRED BURNER

TYPE OF BOILER IF OTHER DESCRIBE:

PULVERIZED	OVERFEED STOKER	UNDERFEED STOKER	SPREADER STOKER	FLUIDIZED BED
☐ WET BED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ CIRCULATING
☐ DRY BED	☐ CONTROLLED	☐ CONTROLLED	☐ FLYASH REINJECTION	☐ RECIRCULATING
			☐ NO FLYASH REINJECTION	

OIL/GAS-FIRED BURNER

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL
TYPE OF FIRING: ☐ NORMAL ☐ TANGENTIAL ☐ LOW NOX BURNERS ☐ NO LOW NOX BURNER

OTHER FUEL-FIRED BURNER

TYPE(S) OF FUEL: _____
TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL
TYPE OF FIRING: _____ TYPE(S) OF CONTROL(S) (IF ANY): _____

FUEL USAGE (INCLUDE STARTUP/BACKUP FUELS)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

FUEL TYPE	SPECIFIC BTU CONTENT	SULFUR CONTENT (% BY WEIGHT)	ASH CONTENT (% BY WEIGHT)
Bark/Wet Wood	**Nominal 4,200 BTU/lb**	**0.011**	

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 12/10/19 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-HM-1 through ES-HM-8**
Dry Hammermills 1 through 8	CONTROL DEVICE ID NO(S): **CD-HM-BF-1 through CD-HM-BF-3, CD-WESP-1, CD-RTO-1**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Dried materials are reduced to appropriate size needed for pelletizing using eight (8) dry hammermills.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
2012	**2012**
MANUFACTURER / MODEL NO.: **Bliss, Model 44-60**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT T ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr

See Emission Calculations in Appendix C

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr

See Emission Calculations in Appendix C

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

OMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURC

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 12/10/19 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-HM-1 through ES-HM-8**
Dry Hammermills 1 through 8	CONTROL DEVICE ID NO(S): **CD-HM-BF-1 through CD-HM-BF-3, CD-WESP-1, CD-RTO-1**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Dried materials are reduced to appropriate size needed for pelletizing using eight (8) dry hammermills.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Dried Wood	**ODT/hr**	**144**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 12/10/19 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DSHM-1 and ES-DSHM-2**
Dry Shavings Hammermills 1 and 2	CONTROL DEVICE ID NO(S): **CD-HM-BF-3, CD-WESP-1, CD-RTO-1**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Dry shavings are reduced to appropriate size needed for pelletizing using two (2) dry shavings hammermill.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
TBD	**TBD**
MANUFACTURER / MODEL NO.: **TBD**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR
IS THIS SOURCE SUBJECT T(☐ NSPS (SUBPARTS?):_____	☐ NESHAP (SUBPARTS?):_____
PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%**	MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr

See Emission Calculations in Appendix C

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr

See Emission Calculations in Appendix C

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURC

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 12/10/19 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DSHM-1 and ES-DSHM-2**
Dry Shavings Hammermills 1 and 2	CONTROL DEVICE ID NO(S): **CD-HM-BF-3, CD-WESP-1, CD-RTO-1**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-1**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Dry shavings are reduced to appropriate size needed for pelletizing using two (2) dry shavings hammermills.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Dry Shavings	**ODT/hr**	**28**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 12/10/19 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-HM-BF-1 through CD-HM-BF-3**		CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-HM-1 through ES-HM-8, ES-DSHM-1 and 2**	
EMISSION POINT (STACK) ID NO(S): **EP-1**		POSITION IN SERIES OF CONTROLS**	NO. **2** OF **3 Units (ES-HM-1 through ES-HM-8)**
			NO. **1** OF **Units (ES-DSHM-1 and 2)**

OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:

Three (3) bag filters will be utilized for emission control on eight (8) dry hammermill cyclones. Dry Hammermills 1 through 3 vent to CD-HM-BF-1, Dry Hammermills 4 through 6 vent through CD-HM-BF-2, and emissions from Dry Hammermills 7 and 8 and the two (2) Dry Shavings Hammermills (ES-DSHM-1 and 2) vent through CD-HM-BF-3.

****Dry Hammermills (ES-HM-1 through ES-HM-8) and Dry Shavings Hammermills (ES-DSHM-1 and 2) will be routed to the WESP (CD-WESP-1) and RTO (CD-RTO-1) after leaving the bag filters (CD-HM-BF-1 through 3). Refer to the control device forms associated with CD-RTO-1 for more information.**

POLLUTANTS COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	**~99.0** %	**~99.0** %	**~99.0** %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN H_20): MIN:	MAX: **6"**	GAUGE? ☑ YES ☐ NO	
BULK PARTICLE DENSITY (LB/FT^3): **1.43E-05**		INLET TEMPERATURE (^oF): MIN	MAX **120**
POLLUTANT LOADING RATE: **0.004** ☐ LB/HR ☑ GR/FT^3		OUTLET TEMPERATURE (^oF) MIN	MAX **100**
INLET AIR FLOW RATE (ACFM): **45,000** each		FILTER OPERATING TEMP (^oF): **N/A**	
NO. OF COMPARTMENTS: **1**	NO. OF BAGS PER COMPARTMENT: **412**	LENGTH OF BAG (IN.): **144**	
NO. OF CARTRIDGES:	FILTER SURFACE AREA PER CARTRIDGE (FT^2):	DIAMETER OF BAG (IN.): **5.75**	
TOTAL FILTER SURFACE AREA (FT^2): **6,250**	AIR TO CLOTH RATIO: **7.20**		
DRAFT TYPE: ☐ INDUCED/NEGATIVE ☑ FORCED/POSITIVE		FILTER MATERIAL: ☐ WOVEN ☑ FELTED	

DESCRIBE CLEANING PROCEDURES

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER:
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM:

The air stream contains wood dust particles. Larger particles are removed by the upstream cyclone for product recovery.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
TOTAL = 100		

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM C2

CONTROL DEVICE (Electrostatic Precipitator)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C2**

CONTROL DEVICE ID NO: **CD-WESP-1**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DRYER-1, ES-GHM-1 through ES-GHM-5, ES-HM-1 through ES-HM-8, ES-DSHM-1 and ES-DSHM-2**
EMISSION POINT (STACK) ID NO(S): **EP-1**	POSITION IN SERIES OF CONTROL NO. **1** OF **2** UNITS (ES-DRYER-1)
	POSITION IN SERIES OF CONTROL NO. **1** OF **2** UNITS (ES-GHM-1 through ES-GHM-5)
	POSITION IN SERIES OF CONTROL NO. **3** OF **3** UNITS (ES-HM-1 through ES-HM-8)
	POSITION IN SERIES OF CONTROL NO. **2** OF **3** UNITS (ES-DSHM-1 and ES-DSHM-2)
MANUFACTURER: **Lundberg E-Tube 115719**	MODEL NO. **Lundberg E-Tube 115719**
OPERATING SCENARIO:	
OPERATING SCENARIO: **1** OF **1**	P.E. SEAL REQUIRED (PER 2Q .0112)? ☐ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
Emissions from the Dryer #1 (ES-DRYER-1) and Green Hammermills (ES-GHM-1 through ES-GHM-5) will be routed to the WESP through a common duct for additional PM, metallic HAP, and HCl removal. Emissions from the Dry Hammermills (ES-HM-1 through ES-HM-8) and Dry Shavings Hammermills (ES-DSHM-1 and ES-DSHM-2) will be controlled by baghouses and then routed to either the Dryer #1 furnace, the Dryer #1 WESP (CD-WESP-1), or a combination of the two.

EQUIPMENT SPECIFICATIONS	GAS DISTRIBUTION GRIDS: ☑ YES ☐ NO
TYPE: ☑ WET ☐ DRY	☑ SINGLE-STAGE ☐ TWO-STAGE
TOTAL COLLECTION PLATE AREA (FT^2): **29,904**	NO. FIELDS **2** NO. COLLECTOR PLATES PER FIELD: **567 tubes**
COLLECTOR PLATE SIZE (FT): LENGTH: **TBD** WIDTH: **TBD**	SPACING BETWEEN COLLECTOR PLATES (INCHES): **12" hextube**
TOTAL DISCHARGE ELECTRODE LENGTH (FT): **19"**	GAS VISCOSITY (POISE): **2.054E-04 Poise**
NUMBER OF DISCHARGE ELECTRODES: **667**	NUMBER OF COLLECTING ELECTRODE RAPPERS: **none**
MAXIMUM INLET AIR FLOW RATE (ACFM): **117,000**	PARTICLE MIGRATION VELOCITY (FT/SEC): **0.234**
MINIMUM GAS TREATMENT TIME (SEC): **2.3**	BULK PARTICLE DENSITY (LB/FT^3): **45 lb/cu. Ft.**
FIELD STRENGTH (VOLTS) CHARGING: **83 kVA** COLLECTIN **N/A**	CORONA POWER (WATTS/1000 CFM): **4000**
ELECTRICAL USAGE (KW/HOUR): **141.5**	
CLEANING PROCEDURES: ☐ RAPPING ☐ PLATE VIBRATING ☑ WASHING ☐ OTHER _____	
OPERATING PARAMETERS PRESSURE DROP (IN. H20): MIN MAX	WARNING ALARM? ☑ YES ☐ NO
RESISTIVITY OF POLLUTANT (OHM-CM): **N/A**	GAS CONDITIONING ☑ YES ☐ NO TYPE OF AGENT (IF YES):
INLET GAS TEMPERATURE (°F): **240 nominal**	OUTLET GAS TEMPERATURE (°F): **180 nominal**
VOLUME OF GAS HANDLED (ACFM): **117,000**	INLET MOISTURE PERCENT: **40%** MIN **50%** MAX

POWER REQUIREMENTS IS AN ENERGY MANAGEMENT SYSTEM USED? ☐ YES ☐ NO

FIELD NO.	NO. OF SETS	CHARGING	EACH TRANSFORMER (kVA)	EACH RECTIFIER Kv Ave/Peak Ma Dc
1	1		118	83/1265
2	1		118	83/1265

POLLUTANT(S) COLLECTED:	$PM/PM_{10}/PM_{2.5}$	Metal HAP/TAP	HCl	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	95 %	92.8 %	90 %	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR)	**See Emissions Calculations in Appendix C**			

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
TOTAL = 100		

DESCRIBE STARTUP PROCEDURES: **TBD**

DESCRIBE MAINTENANCE PROCEDURES: **TBD**

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM

Sodium Hydroxide (NaOH)

DESCRIBE ANY MONITORING DEVICES, GAUGES, OR TEST PORTS AS ATTACHMENTS: **PLC**

COMMENTS:

ATTACH A DIAGRAM OF THE TOP VIEW OF THE ESP WITH DIMENSIONS (include at a minimum the plate spacing and wire spacing and indicate the electrode type), AND THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

Attach Additional Sheets As Necessary

FORM C3

CONTROL DEVICE (THERMAL OR CATALYTIC)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **C3**

AS REQUIRED BY 15A NCAC 2Q .0112, THIS FORM MUST BE SEALED BY A PROFESSIONAL ENGINEER (P.E.) LICENSED IN NORTH CAROLINA.

CONTROL DEVICE ID NO: **CD-RTO-1**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DRYER-1, ES-GHM-1 through ES-GHM-5, ES-HM-1 through ES-HM-8, ES-DSHM-1 and ES-DSHM-2**
EMISSION POINT (STACK) ID NO(S): **EP-1**	POSITION IN SERIES OF CONTROLS NO. 2 OF 2 UNITS (ES-DRYER-1)
	POSITION IN SERIES OF CONTROLS NO. 2 OF 2 UNITS (ES-GHM-1 through ES-GHM-5)
	POSITION IN SERIES OF CONTROLS NO. 3 OF 3 UNITS (ES-HM-1 through ES-HM-8)
	POSITION IN SERIES OF CONTROLS NO. 3 OF 3 UNITS (ES-DSHM-1 and ES-DSHM-2)
MANUFACTURER: **TBD**	MODEL NO: **TBD**
OPERATING SCENARIO:	
1 OF 1	

TYPE ☐ AFTERBURNER ☑ REGENERATIVE THERMAL OXIDATION ☐ RECUPERATIVE THERMAL OXIDATION ☐ CATALYTIC OXIDATION

EXPECTED LIFE OF CATALYST (YRS): **NA** | METHOD OF DETECTING WHEN CATALYST NEEDS REPLACMENT: **NA**

CATALYST MASKING AGENT IN AIR STRE ☐ HALOGEN ☐ SILICONE ☐ PHOSPHOROUS COMPOUND ☐ HEAVY METAL ☐ SULFUR COMPOUND ☐ OTHER (SPECIFY) _____ ☐ NONE

TYPE OF CATALYST: **NA** | CATALYST VOL (FT^3): **NA** | VELOCITY THROUGH CATALYST (FPS): **NA**

SCFM THROUGH CATALYST: **NA**

DESCRIBE CONTROL SYSTEM, INCLUDING RELATION TO OTHER CONTROL DEVICES AND SOURCES, AND ATTACH DIAGRAM OF SYSTEM:
Controls emissions from Dryer #1 (ES-DRYER-1) and Green Hammermills (ES-GHM-1 through ES-GHM-5). Emissions from the Dry Hammermills (ES-HM-1 through ES-HM-8) and Dry Shavings Hammermills (ES-DSHM-1 and ES-DSHM-2)-will be routed to either the Dryer #1 furnace, the Dryer #1 WESP (CD-WESP-1), or a combination of the two prior to control by CD-RTO-1.

POLLUTANT(S) COLLECTED:	**VOC**			
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	**97.5** %	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR) :	**See Emissions Calculations in Appendix C**			

PRESSURE DROP (IN. H_2O MIN MAX **TBD**	OUTLET TEMPERATURE (^oF): **TBD** MIN **TBD** MAX
INLET TEMPERATURE (^oF MIN MAX **TBD**	RESIDENCE TIME (SECONDS): **TBD**
INLET AIR FLOW RATE (ACFM): **TBD** (SCFM): **TBD**	COMBUSTION TEMPERATURE (^oF): **TBD**
COMBUSTION CHAMBER VOLUME (FT^3): **TBD**	INLET MOISTURE CONTENT (%): **TBD**
% EXCESS AIR: **TBD**	CONCENTRATION (ppmv) **TBD** INLET **TBD** OUTLET
AUXILIARY FUEL USED: **Natural Gas**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **24.8**

DESCRIBE MAINTENANCE PROCEDURES:
TBD

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:
N/A

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: **Furnace #1 Bypass**	EMISSION SOURCE ID NO: **ES-FURNACEBYP-1**
	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-3**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

A bypass stack following the furnace (ES-FURNACEBYP-1) will be used to exhaust hot gases during startup, shutdown, and idle mode. During cold start-ups, the furnace bypass stack is used until the refractory is sufficiently heated and can sustain operations at a low level (approximately 15% of the maximum heat input rate). Diesel fuel may be used as an accelerant for cold start-up and the amount used per event shall not exceed 15-30 gallons and the annual usage is not expected to exceed 100-200 gallons per year and emissions resulting are insignificant. In the event of a planned shutdown the furnace heat input is decreased, and all remaining fuel is moved through the system to prevent a fire during the shutdown period. The remaining fuel is combusted prior to opening the furnace bypass stack. The furnace bypass stack is not utilized until after the furnace achieves an idle state (10 MMBtu/hr or less). The purpose of operation in "idle mode" is to maintain the temperature of the fire brick lining the furnaces which may be damaged if it cools too rapidly. Operation in "idle mode" also significantly reduces the amount of time required to restart the dryers. Use of the Furnace Bypass Stack for cold start-up and shutdowns is limited to 50 hours per year and up to 500 hours per year for "idle mode".

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☑ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☐ Other (Form B9)

START CONSTRUCTION DATE: **TBD**	DATE MANUFACTURED: **TBD**
MANUFACTURER / MODEL NO.: **TBD**	EXPECTED OP. SCHEDULE: **NA** HR/DAY **NA** DAY/WK **NA** WK/Y

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B1

EMISSION SOURCE (WOOD, COAL, OIL, GAS, OTHER FUEL-FIRED BURNER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B1**

EMISSION SOURCE DESCRIPTION: **Furnace #1 Bypass**	EMISSION SOURCE ID NO: **ES-FURNACEBYP-1**
	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-3**

DESCRIBE USE: ☑ PROCESS HEAT ☐ SPACE HEAT ☐ ELECTRICAL GENERATION
☐ CONTINUOUS USE ☐ STAND BY/EMERGENCY ☐ OTHER (DESCRIBE): _____

HEATING MECHANISM: ☐ INDIRECT ☑ DIRECT

MAX. FIRING RATE (MMBTU/HOUR): **175.3**

WOOD-FIRED BURNER

WOOD TYPE: ☐ BARK ☐ WOOD/BARK ☑ WET WOOD ☐ DRY WOOD ☐ OTHER (DESCRIBE): _____

PERCENT MOISTURE OF FUEL: **~50%**

☐ UNCONTROLLED ☐ CONTROLLED WITH FLYASH REINJECTION ☑ CONTROLLED W/O REINJECTION

FUEL FEED METHOD: **N/A** HEAT TRANSFER MEDIA: ☐ STEAM ☑ AIR ☐ OTHER (DESCRIBE) _____

COAL-FIRED BURNER

TYPE OF BOILER IF OTHER DESCRIBE:

PULVERIZED	OVERFEED STOKER	UNDERFEED STOKER	SPREADER STOKER	FLUIDIZED BED
☐ WET BED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ CIRCULATING
☐ DRY BED	☐ CONTROLLED	☐ CONTROLLED	☐ FLYASH REINJECTION	☐ RECIRCULATING
			☐ NO FLYASH REINJECTION	

OIL/GAS-FIRED BURNER

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL
TYPE OF FIRING: ☐ NORMAL ☐ TANGENTIAL ☐ LOW NOX BURNERS ☐ NO LOW NOX BURNER

OTHER FUEL-FIRED BURNER

TYPE(S) OF FUEL: _____
TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL
TYPE OF FIRING: _____ TYPE(S) OF CONTROL(S) (IF ANY): _____

FUEL USAGE (INCLUDE STARTUP/BACKUP FUELS)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

FUEL TYPE	SPECIFIC BTU CONTENT	SULFUR CONTENT (% BY WEIGHT)	ASH CONTENT (% BY WEIGHT)
Bark/Wet Wood	**Nominal 4,200 BTU/lb**	**0.011**	

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO:
Dryer #2	**ES-DRYER-2**
	CONTROL DEVICE ID NO(S): **CD-WESP-2, CD-RTO-2**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-4**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Green wood is conveyed to a rotary dryer system. Direct contact heat is provided to the system via a 180 MMBtu/hr burner system. Air emissions will be controlled utilizing a wet electrostatic precipitator (CD-WESP-2) for particulate removal. VOC and organic-HAP emissions will be controlled by a regenerative thermal oxidizer (CD-RTO-2). A bypass stack following the furnace (ES-FURNACEBYP-2) will be used to exhaust hot gases during startup, shutdown, and idle mode.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☑ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☐ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
TBD	**TBD**
MANUFACTURER / MODEL NO.:	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR
TBD	

IS THIS SOURCE SUBJECT T ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr

See Emission Calculations in Appendix C

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr

See Emission Calculations in Appendix C

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

)MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B1

EMISSION SOURCE (WOOD, COAL, OIL, GAS, OTHER FUEL-FIRED BURNER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B1**

EMISSION SOURCE DESCRIPTION: **Dryer #2**	EMISSION SOURCE ID NO: **ES-DRYER-2**
	CONTROL DEVICE ID NO(S): **CD-WESP-2 , CD-RTO-2**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-4**

DESCRIBE USE: ☑ PROCESS HEAT ☐ SPACE HEAT ☐ ELECTRICAL GENERATION
☐ CONTINUOUS USE ☐ STAND BY/EMERGENCY ☐ OTHER (DESCRIBE): _____

HEATING MECHANISM: ☐ INDIRECT ☑ DIRECT

MAX. FIRING RATE (MMBTU/HOUR): **180**

WOOD-FIRED BURNER

WOOD TYPE: ☐ BARK ☐ WOOD/BARK ☑ WET WOOD ☐ DRY WOOD ☐ OTHER (DESCRIBE): _____

PERCENT MOISTURE OF FUEL: **~50%**

☐ UNCONTROLLED ☐ CONTROLLED WITH FLYASH REINJECTION ☑ CONTROLLED W/O REINJECTION

FUEL FEED METHOD: **N/A** HEAT TRANSFER MEDIA: ☐ STEAM ☑ AIR ☐ OTHER (DESCRIBE) _____

COAL-FIRED BURNER

TYPE OF BOILER IF OTHER DESCRIBE:

PULVERIZED	OVERFEED STOKER	UNDERFEED STOKER	SPREADER STOKER	FLUIDIZED BED
☐ WET BED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ CIRCULATING
☐ DRY BED	☐ CONTROLLED	☐ CONTROLLED	☐ FLYASH REINJECTION	☐ RECIRCULATING
			☐ NO FLYASH REINJECTION	

OIL/GAS-FIRED BURNER

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL

TYPE OF FIRING: ☐ NORMAL ☐ TANGENTIAL ☐ LOW NOX BURNERS ☐ NO LOW NOX BURNER

OTHER FUEL-FIRED BURNER

TYPE(S) OF FUEL: _____

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL

TYPE OF FIRING: _____ TYPE(S) OF CONTROL(S) (IF ANY): _____

FUEL USAGE (INCLUDE STARTUP/BACKUP FUELS)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

FUEL TYPE	SPECIFIC BTU CONTENT	SULFUR CONTENT (% BY WEIGHT)	ASH CONTENT (% BY WEIGHT)
Bark/Wet Wood	**Nominal 4,200 BTU/lb**	**0.011**	

COMMENTS:

Attach Additional Sheets As Necessary

FORM C2

CONTROL DEVICE (Electrostatic Precipitator)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C2**

CONTROL DEVICE ID NO: **CD-WESP-2**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DRYER-2**
EMISSION POINT (STACK) ID NO(S): **EP-4**	POSITION IN SERIES OF CONTROL NO. **1** OF **2** UNITS
MANUFACTURER: **TBD**	MODEL NO. **TBD**
OPERATING SCENARIO:	
OPERATING SCENARIO: **1** OF **1**	P.E. SEAL REQUIRED (PER 2Q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
Emissions from the Dryer will be routed to the WESP (CD-WESP-2) for PM, metallic HAP, and HCl removal.

EQUIPMENT SPECIFICATIONS	GAS DISTRIBUTION GRIDS: ☑ YES ☐ NO
TYPE: ☑ WET ☐ DRY	☑ SINGLE-STAGE ☐ TWO-STAGE
TOTAL COLLECTION PLATE AREA (FT^2): **TBD**	NO. FIELDS **TBD** NO. COLLECTOR PLATES PER FIELD: **TBD**
COLLECTOR PLATE SIZE (FT): LENGTH: **TBD** WIDTH: **TBD**	SPACING BETWEEN COLLECTOR PLATES (INCHES): **TBD**
TOTAL DISCHARGE ELECTRODE LENGTH (FT): **TBD**	GAS VISCOSITY (POISE): **TBD**
NUMBER OF DISCHARGE ELECTRODES: **TBD**	NUMBER OF COLLECTING ELECTRODE RAPPERS: **TBD**
MAXIMUM INLET AIR FLOW RATE (ACFM): **TBD**	PARTICLE MIGRATION VELOCITY (FT/SEC): **TBD**
MINIMUM GAS TREATMENT TIME (SEC): **TBD**	BULK PARTICLE DENSITY (LB/FT^3): **TBD**
FIELD STRENGTH (VOLTS) CHARGING: COLLECTING: **TBD**	CORONA POWER (WATTS/1000 CFM): **TBD**
ELECTRICAL USAGE (KW/HOUR): **TBD**	
CLEANING PROCEDURES: ☐ RAPPING ☐ PLATE VIBRATING ☐ WASHING ☐ OTHER _____	
OPERATING PARAMETERS	PRESSURE DROP (IN. H20): MIN MAX WARNING ALARM? ☐ YES ☐ NO
RESISTIVITY OF POLLUTANT (OHM-CM): **TBD**	GAS CONDITIONING? ☐ YES ☐ NO TYPE OF AGENT (IF YES):
INLET GAS TEMPERATURE (°F): **TBD**	OUTLET GAS TEMPERATURE (°F): **TBD**
VOLUME OF GAS HANDLED (ACFM): **TBD**	INLET MOISTURE PERCENT: **TBD** MIN **TBD** MAX
POWER REQUIREMENTS	IS AN ENERGY MANAGEMENT SYSTEM USED? ☐ YES ☐ NO

FIELD NO.	NO. OF SETS	CHARGING	EACH TRANSFORMER (kVA)	EACH RECTIFIER Kv Ave/Peak Ma Dc

POLLUTANT(S) COLLECTED:	$PM/PM_{10}/PM_{2.5}$	Metal HAP/TAP	HCl	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	95 %	92.8 %	90 %	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR)	**See Emission Calculations in Appendix C**			

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
TOTAL = 100		

DESCRIBE STARTUP PROCEDURES: **TBD**

DESCRIBE MAINTENANCE PROCEDURES: **TBD**

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM

Sodium Hydroxide (NaOH)

DESCRIBE ANY MONITORING DEVICES, GAUGES, OR TEST PORTS AS ATTACHMENTS: **PLC**

COMMENTS:

ATTACH A DIAGRAM OF THE TOP VIEW OF THE ESP WITH DIMENSIONS (include at a minimum the plate spacing and wire spacing and indicate the electrode type), AND THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

Attach Additional Sheets As Necessary

FORM C3

CONTROL DEVICE (THERMAL OR CATALYTIC)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **C3**

AS REQUIRED BY 15A NCAC 2Q .0112, THIS FORM MUST BE SEALED BY A PROFESSIONAL ENGINEER (P.E.) LICENSED IN NORTH CAROLINA.

CONTROL DEVICE ID NO: **CD-RTO-2**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DRYER-2**
EMISSION POINT (STACK) ID NO(S): **EP-4**	POSITION IN SERIES OF CONTROLS NO. **2** OF **2** UNITS
MANUFACTURER: **TBD**	MODEL NO: **TBD**
OPERATING SCENARIO:	
1 OF **1**	

TYPE ☐ AFTERBURNER ☑ REGENERATIVE THERMAL OXIDATION ☐ RECUPERATIVE THERMAL OXIDATION ☐ CATALYTIC OXIDATION

EXPECTED LIFE OF CATALYST (YRS): **NA**	METHOD OF DETECTING WHEN CATALYST NEEDS REPLACMENT: **NA**

CATALYST MASKING AGENT IN AIR STRE ☐ HALOGEN ☐ SILICONE ☐ PHOSPHOROUS COMPOUND ☐ HEAVY METAL ☐ SULFUR COMPOUND ☐ OTHER (SPECIFY) _____ ☐ NONE

TYPE OF CATALYST: **NA**	CATALYST VOL (FT^3): **NA**	VELOCITY THROUGH CATALYST (FPS): **NA**

SCFM THROUGH CATALYST: **NA**

DESCRIBE CONTROL SYSTEM, INCLUDING RELATION TO OTHER CONTROL DEVICES AND SOURCES, AND ATTACH DIAGRAM OF SYSTEM:
Emissions leaving the WESP (CD-WESP-2) will enter the RTO (CD-RTO-2) prior to being emitted to the atmosphere.

POLLUTANT(S) COLLECTED:	**VOC**			
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	**97.5** %	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR) :	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN. H_2O MIN MAX **TBD**	OUTLET TEMPERATURE (^oF): **TBD** MIN **TBD** MAX
INLET TEMPERATURE (^oF MIN MAX **TBD**	RESIDENCE TIME (SECONDS): **TBD**
INLET AIR FLOW RATE (ACFM): **TBD** (SCFM): **TBD**	COMBUSTION TEMPERATURE (^oF): **TBD**
COMBUSTION CHAMBER VOLUME (FT^3): **TBD**	INLET MOISTURE CONTENT (%): **TBD**
% EXCESS AIR: **TBD**	CONCENTRATION (ppmv) **TBD** INLET **TBD** OUTLET
AUXILIARY FUEL USED: **Natural Gas**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **24.8**

DESCRIBE MAINTENANCE PROCEDURES:
TBD

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:
N/A

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-FURNACEBYP-2**
Furnace #2 Bypass	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-6**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

A bypass stack following the furnace (ES-FURNACEBYP-2) will be used to exhaust hot gases during startup, shutdown, and idle mode. During cold start-ups, the furnace bypass stack is used until the refractory is sufficiently heated and can sustain operations at a low level (approximately 15% of the maximum heat input rate). Diesel fuel may be used as an accelerant for cold start-up and the amount used per event shall not exceed 15-30 gallons and the annual usage is not expected to exceed 100-200 gallons per year and emissions resulting are insignificant. In the event of a planned shutdown the furnace heat input is decreased, and all remaining fuel is moved through the system to prevent a fire during the shutdown period. The remaining fuel is combusted prior to opening the furnace bypass stack. The furnace bypass stack is not utilized until after the furnace achieves an idle state (10 MMBtu/hr or less). The purpose of operation in "idle mode" is to maintain the temperature of the fire brick lining the furnaces which may be damaged if it cools too rapidly. Operation in "idle mode" also significantly reduces the amount of time required to restart the dryers. Use of the Furnace Bypass Stack for cold start-up and shutdowns is limited to 50 hours per year and up to 500 hours per year for "idle mode".

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☑ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☑ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☐ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
TBD	**TBD**
MANUFACTURER / MODEL NO.: **TBD**	EXPECTED OP. SCHEDULE: **NA** HR/DAY **NA** DAY/WK **NA** WK/

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B1

EMISSION SOURCE (WOOD, COAL, OIL, GAS, OTHER FUEL-FIRED BURNER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B1**

EMISSION SOURCE DESCRIPTION: **Furnace #2 Bypass**	EMISSION SOURCE ID NO: **ES-FURNACEBYP-2**
	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-6**

DESCRIBE USE: ☑ PROCESS HEAT ☐ SPACE HEAT ☐ ELECTRICAL GENERATION
☐ CONTINUOUS USE ☐ STAND BY/EMERGENCY ☐ OTHER (DESCRIBE): _____

HEATING MECHANISM: ☐ INDIRECT ☑ DIRECT

MAX. FIRING RATE (MMBTU/HOUR): **180**

WOOD-FIRED BURNER

WOOD TYPE: ☐ BARK ☐ WOOD/BARK ☑ WET WOOD ☐ DRY WOOD ☐ OTHER (DESCRIBE): _____

PERCENT MOISTURE OF FUEL: **~50%**

☐ UNCONTROLLED ☐ CONTROLLED WITH FLYASH REINJECTION ☑ CONTROLLED W/O REINJECTION

FUEL FEED METHOD: **N/A** HEAT TRANSFER MEDIA: ☐ STEAM ☑ AIR ☐ OTHER (DESCRIBE) _____

COAL-FIRED BURNER

TYPE OF BOILER IF OTHER DESCRIBE:

PULVERIZED	OVERFEED STOKER	UNDERFEED STOKER	SPREADER STOKER	FLUIDIZED BED
☐ WET BED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ UNCONTROLLED	☐ CIRCULATING
☐ DRY BED	☐ CONTROLLED	☐ CONTROLLED	☐ FLYASH REINJECTION	☐ RECIRCULATING
			☐ NO FLYASH REINJECTION	

OIL/GAS-FIRED BURNER

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL
TYPE OF FIRING: ☐ NORMAL ☐ TANGENTIAL ☐ LOW NOX BURNERS ☐ NO LOW NOX BURNER

OTHER FUEL-FIRED BURNER

TYPE(S) OF FUEL: _____
TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL
TYPE OF FIRING: _____ TYPE(S) OF CONTROL(S) (IF ANY): _____

FUEL USAGE (INCLUDE STARTUP/BACKUP FUELS)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

FUEL TYPE	SPECIFIC BTU CONTENT	SULFUR CONTENT (% BY WEIGHT)	ASH CONTENT (% BY WEIGHT)
Bark/Wet Wood	**Nominal 4,200 BTU/lb**	**0.011**	

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO:
Dried Wood Handling 1 and 2	**ES-DWH-1 and ES-DWH-2**
	CONTROL DEVICE ID NO(S): **CD-DWH-BV; CD-DWH-BF-2**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-7 and EP-21**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Dried Wood Handling (ES-DWH-1 and 2) will include partially enclosed conveyor systems and conveyor transfer points located after each dryer. PM emissions from the existing dryer line dry wood handling system (ES-DWH-1) are controlled by an existing passive bin vent (CD-DWH-BV). PM emissions from the new dryer line dried wood handling system (ES-DWH-2) will be controlled by a baghouse (CD-DWH-BF-2).

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
MANUFACTURER / MODEL NO.:	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT T(☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

OMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DWH-1 and ES-DWH-2**
Dried Wood Handling 1 and 2	CONTROL DEVICE ID NO(S): **CD-DWH-BV; CD-DWH-BF-2**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-7 and EP-21**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Dried Wood Handling (ES-DWH-1 and 2) will include partially enclosed conveyor systems and conveyor transfer points located after each dryer. PM emissions from the existing dryer line dry wood handling system (ES-DWH-1) are controlled by an existing passive bin vent (CD-DWH-BV). PM emissions from the new dryer line dried wood handling system (ES-DWH-2) will be controlled by a baghouse (CD-DWH-BF-2).

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Dried Wood	**ODT/hr**	**154**	

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-DWH-BV**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DWH-1**
EMISSION POINT (STACK) ID NO(S): **EP-7**	POSITION IN SERIES OF CONTROLS NO. **1** OF **1** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
PM emissions from the existing dryer line dry wood handling system (ES-DWH-1) are controlled by an existing passive bin vent (CD-DWH-BV).

POLLUTANTS COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	**~99.0** %	**~99.0** %	**~99.0** %	%
CONTROL DEVICE EFFICIENCY:	**0** %	**0** %	**0** %	%
CORRESPONDING OVERALL EFFICIENCY:	%		%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN H_20): MIN: MAX: **TBD** GAUGE? ☐ YES ☑ NO		
BULK PARTICLE DENSITY (LB/FT^3): **TBD**	INLET TEMPERATURE (^oF): MIN	MAX **TBD**
POLLUTANT LOADING RATE: ☐ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) MIN	MAX **TBD**
INLET AIR FLOW RATE (ACFM): **Unknown**	FILTER OPERATING TEMP (^oF): **N/A**	
NO. OF COMPARTMENTS: **TBD**	NO. OF BAGS PER COMPARTMENT: **TBD**	LENGTH OF BAG (IN.): **TBD**
NO. OF CARTRIDGES: **TBD**	FILTER SURFACE AREA PER CARTRIDGE (FT^2): **TBD**	DIAMETER OF BAG (IN.): **TBD**
TOTAL FILTER SURFACE AREA (FT^2): **TBD**	AIR TO CLOTH RATIO: **TBD**	
DRAFT TYPE: ☐ INDUCED/NEGATIVE ☐ FORCED/POSITIVE	FILTER MATERIAL: ☐ WOVEN ☐ FELTED	

DESCRIBE CLEANING PROCEDURES

☐ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:
The air stream will contain wood dust particles.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-DWH-BF-2**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-DWH-2**
EMISSION POINT (STACK) ID NO(S): **EP-21**	POSITION IN SERIES OF CONTROLS NO. **1** OF **1** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
A bag filter will be utilized for emission control on Dried Wood Handling operations at the post dryer conveyor for Dryer Line #2.

POLLUTANTS COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	**~99.0** %	**~99.0** %	**~99.0** %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%		%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN H_20): MIN:	MAX: **TBD**	GAUGE? ☑ YES ☐ NO	
BULK PARTICLE DENSITY (LB/FT^3): **TBD**		INLET TEMPERATURE (^oF): MIN	MAX **TBD**
POLLUTANT LOADING RATE: **0.004** ☐ LB/HR ☑ GR/FT^3		OUTLET TEMPERATURE (^oF): MIN	MAX **TBD**
INLET AIR FLOW RATE (ACFM): **2,500**		FILTER OPERATING TEMP (^oF): **N/A**	
NO. OF COMPARTMENTS: **TBD**	NO. OF BAGS PER COMPARTMENT: **TBD**	LENGTH OF BAG (IN.): **TBD**	
NO. OF CARTRIDGES: **TBD**	FILTER SURFACE AREA PER CARTRIDGE (FT^2): **TBD**	DIAMETER OF BAG (IN.): **TBD**	
TOTAL FILTER SURFACE AREA (FT^2): **TBD**	AIR TO CLOTH RATIO: **TBD**		

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☑ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES:

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:
The air stream will contain wood dust particles.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DLC-1**
Dry Line Feed Conveyor	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-23**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Dry shavings are transferred to the dry hammermill pre-screeners via the Dry Line Feed Conveyor (ES-DLC-1) and dry hammermill feed conveyor.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☑ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
2014	**2014**
MANUFACTURER / MODEL NO.: **Enviva Built**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/Y

IS THIS SOURCE SUBJECT T(☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr

See Emission Calculations in Appendix C

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr

See Emission Calculations in Appendix C

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-DLC-1**
Dry Line Feed Conveyor	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-9**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Dry shavings are transferred to the dry hammermill pre-screeners via the Dry Line Feed Conveyor (ES-DLC-1) and dry hammermill feed conveyor.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Dry Shavings	**tons/hr**	**10**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-PS-1 and ES-PS-2**
Dry Hammermill Prescreeners 1 and 2	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-8 and EP-22**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

The dry hammermill pre-screeners will screen chips: large chips will be sent to the Dry Hammermills for further reduction. Small chips will be sent to the Pellet Mill Feed Silo.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
MANUFACTURER / MODEL NO.:	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT TO ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

OMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-PS-1 and ES-PS-2**
Dry Hammermill Prescreeners 1 and 2	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-8 and EP-22**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
The dry hammermill pre-screeners will screen chips: large chips will be sent to the Dry Hammermills for further reduction. Small chips will be sent to the Pellet Mill Feed Silo.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Dried Wood	**ton/hr**	**10**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-PMFS**
Pellet Mill Feed Silo	CONTROL DEVICE ID NO(S): **CD-PMFS-BV**
OPERATING SCENARIO 1 OF 1	EMISSION POINT (STACK) ID NO(S): **EP-11**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
A pellet press silo stores dried ground wood prior to transport to the pellet presses.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☑ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☐ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
2013	
MANUFACTURER / MODEL NO.:	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR
Laidig 533	

IS THIS SOURCE SUBJECT T ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		N/A						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		N/A			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

)MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: **Pellet Mill Feed Silo**	EMISSION SOURCE ID NO: **ES-PMFS**
	CONTROL DEVICE ID NO(S): **CD-PMFS-BV**
OPERATING SCENARIO: 1 OF 1	EMISSION POINT(STACK) ID NO(S): **EP-11**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
A pellet press silo stores dried ground wood prior to transport to the pellet presses.

MATERIAL STORED: **Pellet Mill Feed Material**				DENSITY OF MATERIAL (LB/FT3): **40**		
CAPACITY	CUBIC FEET:			TONS:		
DIMENSIONS (FEET)	HEIGHT:	DIAMETER:	***(OR)***	LENGTH:	WIDTH:	HEIGHT:
ANNUAL PRODUCT THROUGHPUT (TONS)	ACTUAL:			MAXIMUM DESIGN CAPACITY:		

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☑ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☑ OTHER: **Conveyor**

NO. FILL TUBES:

MAXIMUM ACFM:

MATERIAL IS UNLOADED TO:

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): **152**

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): **152**

COMMENTS:

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-PMFS-BV**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-PMFS**
EMISSION POINT (STACK) ID NO(S): **EP-11**	POSITION IN SERIES OF CONTROLS NO. **1** OF **1** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
A bin vent filter is used to create a slight negative pressure on the Pellet Mill Feed Silo (ES-PMFS). The bin vent collects dust from the air volume present in the silo. The bin vent is sized to offset the air displacement created by material feed to the silo.

POLLUTANTS COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	**~99.0** %	**~99.0** %	**~99.0** %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN H_20): MIN: MAX: **4"** GAUGE? ☑ YES ☐ NO	
BULK PARTICLE DENSITY (LB/FT^3): **1.43E-06**	INLET TEMPERATURE (^oF): MIN MAX **Ambient**
POLLUTANT LOADING RATE: **0.004** ☐ LB/HR ☑ GR/FT^3	OUTLET TEMPERATURE (^oF): MIN MAX **Ambient**
INLET AIR FLOW RATE (ACFM): **2,500**	FILTER OPERATING TEMP (^oF): **N/A**

NO. OF COMPARTMENTS: **1**	NO. OF BAGS PER COMPARTMENT: **1**	LENGTH OF BAG (IN.): **120**
NO. OF CARTRIDGES:	FILTER SURFACE AREA PER CARTRIDGE (FT^2):	DIAMETER OF BAG (IN.): **5.875**
TOTAL FILTER SURFACE AREA (FT^2): **377**	AIR TO CLOTH RATIO: **6**	

DRAFT TYPE: ☐ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☐ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES:

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:
The air stream will contain wood dust particles.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/1 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-PCHP**
Pellet Cooler HP Fines Relay System	CONTROL DEVICE ID NO(S): **CD-PCHP-BV**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-12**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Fine pellet material from the pellet coolers and finished product handling is collected in the pellet cooler high pressure fines relay system which is controlled by a baghouse.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☑ Storage silos/bins (Form B6)	☐ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
MANUFACTURER / MODEL NO.: **Aircon**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		N/A						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		N/A			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUI

Attach Additional Sheets As Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO: **ES-PCHP**
Pellet Cooler HP Fines Relay System	CONTROL DEVICE ID NO(S): **CD-PCHP-BV**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT(STACK) ID NO(S): **EP-12**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Fine pellet material from the pellet coolers and finished product handling is collected in the pellet cooler high pressure fines relay system which is controlled by a baghouse.

MATERIAL STORED: **Fine Pellet Material**				DENSITY OF MATERIAL (LB/FT3): **40**	
CAPACITY	CUBIC FEET: **2,200**			TONS:	
DIMENSIONS (FEET)	HEIGHT:	DIAMETER: **12**	***(OR)***	LENGTH: WIDTH: HEIGHT:	
ANNUAL PRODUCT THROUGHPUT (TONS)	ACTUAL:			MAXIMUM DESIGN CAPACITY: **10 tph**	

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☑ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☑ OTHER: **Conveyor**

NO. FILL TUBES:

MAXIMUM ACFM:

MATERIAL IS UNLOADED TO:

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): **TBD**

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): **TBD**

COMMENTS:

Attach Additional Sheets As Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-PCHP-BV**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-PCHP**
EMISSION POINT (STACK) ID NO(S): **EP-12**	POSITION IN SERIES OF CONTROLS NO. **1** OF **1** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:

A baghouse is used to create a slight negative pressure on the Pellet Cooler HP Fines Relay System (ES-PCHP). The baghouse collects dust from the air volume present in the silo. The baghouse is sized to offset the air displacement created by material feed to the silo.

POLLUTANTS COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	**~99.0** %	**~99.0** %	**~99.0** %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN H_20): MIN: MAX: **TBD** GAUGE? ☑ YES ☐ NO	
BULK PARTICLE DENSITY (LB/FT^3): **TBD**	INLET TEMPERATURE (^oF): MIN MAX **TBD**
POLLUTANT LOADING RATE: **0.004** ☐ LB/HR ☑ GR/FT^3	OUTLET TEMPERATURE (^oF): MIN MAX **TBD**
INLET AIR FLOW RATE (ACFM): **3,600**	FILTER OPERATING TEMP (^oF): **N/A**

NO. OF COMPARTMENTS: **TBD**	NO. OF BAGS PER COMPARTMENT: **TBD**	LENGTH OF BAG (IN.): **TBD**
NO. OF CARTRIDGES: **TBD**	FILTER SURFACE AREA PER CARTRIDGE (FT^2): **TBD**	DIAMETER OF BAG (IN.): **TBD**
TOTAL FILTER SURFACE AREA (FT^2): **TBD**	AIR TO CLOTH RATIO: **TBD**	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☐ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES:

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:

The air stream will contain wood dust particles. Larger particles will be removed by the upstream cyclone.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION:	EMISSION SOURCE ID NO:
Pellet Presses and Pellet Coolers 1 through 6	**ES-CLR-1 through ES-CLR-6**
	CONTROL DEVICE ID NO(S): **CD-CLR-1 through CD-CLR-6, CD-RCO-2**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-18**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Six (6) pellet coolers follow the pellet presses to cool the newly formed pellets down to an acceptable storage temperature.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE:	DATE MANUFACTURED:
2012	**2012**
MANUFACTURER / MODEL NO.: **Kahl Press 60-1250**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT T ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	**See Emission Calculations in Appendix C**						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		See Emission Calculations in Appendix C						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		See Emission Calculations in Appendix C			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

OMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: **Pellet Presses and Pellet Coolers 1 through 6**	EMISSION SOURCE ID NO: **ES-CLR-1 through ES-CLR-6**
	CONTROL DEVICE ID NO(S): **CD-CLR-1 through CD-CLR-6, CD-RCO-2**
OPERATING SCENARIO: 1 OF 1	EMISSION POINT (STACK) ID NO(S): **EP-18**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Six (6) pellet coolers follow the pellet presses to cool the newly formed pellets down to an acceptable storage temperature.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Wood Pellets	**ODT/hr**	**144**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM C4

CONTROL DEVICE (CYCLONE, MULTICYCLONE, OR OTHER MECHANICAL)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C4**

CONTROL DEVICE ID NO: **CD-CLR-1 through CD-CLR-6**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-CLR-1 through ES-CLR-6**
EMISSION POINT (STACK) ID NO(S): **EP-18**	POSITION IN SERIES OF CONTROLS NO. **1** OF **2** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2Q .0112)? ☐ YES ☐ NO

DESCRIBE CONTROL SYSTEM :
Six (6) identical high efficiency cyclones capture bulk PM emissions from six (6) pellet coolers (ES-CLR-1 through ES-CLR-6). Each cooler vents to one dedicated cyclone and all cyclones will be routed to a RTO/RCO.

	PM	PM_{10}	$PM_{2.5}$	
POLLUTANT(S) COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):			144	
CAPTURE EFFICIENCY:	**90+** %	**90+** %	**90+** %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN. H_20): _____ MIN **6"** MAX

INLET TEMPERATURE (^oF): _____ MIN **Ambient** MAX	OUTLET TEMPERATURE (^oF): _____ MIN **Ambient** MAX
INLET AIR FLOW RATE (ACFM): **17,100 (each)**	BULK PARTICLE DENSITY (LB/FT^3): **2.86E-05**
POLLUTANT LOADING RATE (GR/FT^3): **0.01 (inlet)**	

SETTLING CHAMBER	CYCLONE			MULTICYCLONE
LENGTH (INCHES):	INLET VELOCITY (FT/SEC): **94.75**		☐ CIRCULAR ☐ RECTANGLE	NO. TUBES:
WIDTH (INCHES):	*DIMENSIONS (INCHES) See instructions*		*IF WET SPRAY UTILIZED*	DIAMETER OF TUBES:
HEIGHT (INCHES):	H: **38"**	Dd: **22"**	LIQUID USED:	HOPPER ASPIRATION SYSTEM?
VELOCITY (FT/SEC.):	W: **25"**	Lb: **74.25"**	FLOW RATE (GPM):	☐ YES ☐ NO
NO. TRAYS:	De: **32"**	Lc: **84.5"**	MAKE UP RATE (GPM):	LOUVERS?
NO. BAFFLES:	D: **54"**	S: **44.38"**		☐ YES ☐ NO
	TYPE OF CYCLONE: ☐ CONVENTIONAL		☑ HIGH EFFICIENCY ☐ OTHER	

DESCRIBE MAINTENANCE PROCEDURES:
Periodic inspection of mechanical integrity during plant outages as specified by the manufacturer.

DESCRIBE INCOMING AIR STREAM:
The material will be pulled through the cyclone under negative pressure. The cyclone will separate the material from the air stream and the air will discharge to CD-RCO-2.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
		TOTAL = 100

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC:
N/A

ON A SEPARATE PAGE, ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

Attach Additional Sheets As Necessary

FORM C3

CONTROL DEVICE (THERMAL OR CATALYTIC)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **C3**

AS REQUIRED BY 15A NCAC 2Q .0112, THIS FORM MUST BE SEALED BY A PROFESSIONAL ENGINEER (P.E.) LICENSED IN NORTH CAROLINA.

CONTROL DEVICE ID NO: **CD-RCO-2**

CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-CLR-1 through ES-CLR-6**

POSITION IN SERIES OF CONTROLS NO. **2** OF **2** UNITS

MANUFACTURER: **TBD**

MODEL NO: **TBD**

OPERATING SCENARIO: **1** OF **1**

TYPE ☐ AFTERBURNER ☑ REGENERATIVE THERMAL OXIDATION ☐ RECUPERATIVE THERMAL OXIDATION ☑ CATALYTIC OXIDATION

EXPECTED LIFE OF CATALYST (YRS): **TBD**

METHOD OF DETECTING WHEN CATALYST NEEDS REPLACMENT: **TBD**

CATALYST MASKING AGENT IN AIR STRE ☐ HALOGEN ☐ SILICONE ☐ PHOSPHOROUS COMPOUND ☐ HEAVY METAL ☐ SULFUR COMPOUND ☑ OTHER (SPECIFY) **TBD** ☐ NONE

TYPE OF CATALYST: **TBD**

CATALYST VOL (FT^3): **TBD**

VELOCITY THROUGH CATALYST (FPS): **TBD**

SCFM THROUGH CATALYST: **TBD**

DESCRIBE CONTROL SYSTEM, INCLUDING RELATION TO OTHER CONTROL DEVICES AND SOURCES, AND ATTACH DIAGRAM OF SYSTEM:

After leaving the pellet coolers (ES-CLR-1 through ES-CLR-6), emissions will pass through a cyclone, and then will be routed to a quench duct and RTO/RCO (CD-RCO-2). The RTO/RCO will have the ability to operate in thermal (RTO) or catalytic (RCO) mode. See the forms associated with the pellet coolers for more information.

POLLUTANT(S) COLLECTED:	**VOC**			
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	**95** %	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR) :	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN. H_2O MIN MAX **TBD**

OUTLET TEMPERATURE (°F): **TBD** MIN **TBD** MAX

INLET TEMPERATURE (°F) MIN MAX **TBD**

RESIDENCE TIME (SECONDS): **TBD**

INLET AIR FLOW RATE (ACFM): **TBD** (SCFM): **TBD**

COMBUSTION TEMPERATURE (°F): **TBD**

COMBUSTION CHAMBER VOLUME (FT^3): **TBD**

INLET MOISTURE CONTENT (%): **TBD**

% EXCESS AIR: **TBD**

CONCENTRATION (ppmv) **TBD** INLET **TBD** OUTLET

AUXILIARY FUEL USED: **Natural Gas**

TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **Two (2) burners at 6.2 MMBtu/hr each**

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:

N/A

COMMENTS:

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: **Finished Product Handling, Twelve Pellet Loadout Bins, Pellet Mill Loadout 1 and 2**	EMISSION SOURCE ID NO: **ES-FPH, ES-PB-1 through ES-PB-12, ES-PL-1, ES-PL-2**
	CONTROL DEVICE ID NO(S): **CD-FPH-BF**
OPERATING SCENARIO **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-13**

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Pelletized product is conveyed to pellet loadout bins that feed two pellet mill loadout operations (ES-PL-1 and ES-PL-2). Emissions from the Pellet Loadout Bins are controlled by a bagfilter (CD-FPH-BF). Pellet Loadout is accomplished by gravity feed of the pellets into trucks through a covered shoot that automatically telescopes upward during the loadout process to maintain constant contact with the product as it is loaded to prevent PM emissions. Although emissions to the atmosphere from conveyance from storage bins are minimal because dried wood fines have been removed in the pellet coolers, a slight negative pressure is maintained in the loadout building as a fire protection measure. The slight negative pressure is produced via an induced draft fan that exhausts to the same bagfilter that controls PM emissions from loading of the pellet press silo. Trucks are also covered immediately after loading.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☑ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE: **2013**	DATE MANUFACTURED:
MANUFACTURER / MODEL NO.: **Agra 1200 Pellet Storage**	EXPECTED OP. SCHEDULE: **24** HR/DAY **7** DAY/WK **52** WK/YR

IS THIS SOURCE SUBJECT TO: ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB **25%** MAR-MAY **25%** JUN-AUG **25%** SEP-NOV **25%**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)							
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

See Emission Calculations in Appendix C

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
		N/A						

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
		N/A			

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

)MPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOUR

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: **Finished Product Handling**	EMISSION SOURCE ID NO: **ES-FPH**
	CONTROL DEVICE ID NO(S): **CD-FPH-BF**
OPERATING SCENARIO: 1 OF 1	EMISSION POINT (STACK) ID NO(S): **EP-13**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Collection of transfer points, pellet screening operations, and pellet conveying.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY	LIMITATION(UNIT/HR)
Wood Pellets	**ODT/yr**	**781,255**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM B6

EMISSION SOURCE (STORAGE SILO/BINS)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B6**

EMISSION SOURCE DESCRIPTION: **Twelve Pellet Loadout Bins**	EMISSION SOURCE ID NO: **ES-PB-1 through ES-PB-12**
	CONTROL DEVICE ID NO(S): **CD-FPH-BF**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT(STACK) ID NO(S): **EP-13**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Pellet Loadout Bins are used to store pellets for shipping. Pellets are then loaded from the bins into trucks in one of two pellet loadout areas.

MATERIAL STORED: **Pellet Product**				DENSITY OF MATERIAL (LB/FT3): **40**	
CAPACITY	CUBIC FEET: **2,200**			TONS:	
DIMENSIONS (FEET)	HEIGHT:	DIAMETER: **12**	***(OR)***	LENGTH: WIDTH: HEIGHT:	
ANNUAL PRODUCT THROUGHPUT (TONS)	ACTUAL:			MAXIMUM DESIGN CAPACIT` **781255 ODT/yr**	

PNEUMATICALLY FILLED	MECHANICALLY FILLED	FILLED FROM
☐ BLOWER	☐ SCREW CONVEYOR	☐ RAILCAR
☐ COMPRESSOR	☑ BELT CONVEYOR	☐ TRUCK
☐ OTHER:	☐ BUCKET ELEVATOR	☐ STORAGE PILE
	☐ OTHER:	☑ OTHER: **Conveyor**

NO. FILL TUBES:

MAXIMUM ACFM: **750 each**

MATERIAL IS UNLOADED TO:

BY WHAT METHOD IS MATERIAL UNLOADED FROM SILO?

MAXIMUM DESIGN FILLING RATE OF MATERIAL (TONS/HR): **144 ODT/hr**

MAXIMUM DESIGN UNLOADING RATE OF MATERIAL (TONS/HR): **144 ODT/hr**

COMMENTS:

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: **Pellet Mill Loadout 1 and 2**	EMISSION SOURCE ID NO: **ES-PL-1 and ES-PL-2**
	CONTROL DEVICE ID NO(S): **CD-FPH-BF**
OPERATING SCENARIO: **1** OF **1**	EMISSION POINT (STACK) ID NO(S): **EP-13**

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):
Final product is loaded into trucks in one of two pellet loadout areas.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)
Wood Pellets	**ODT/yr**	**781,255**	**N/A**

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED: **N/A**	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): **N/A**
MAX. CAPACITY HOURLY FUEL USE: **N/A**	REQUESTED CAPACITY ANNUAL FUEL USE: **N/A**

COMMENTS:

Attach Additional Sheets as Necessary

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C1**

CONTROL DEVICE ID NO: **CD-FPH-BF**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): **ES-FPH, ES-PB-1 through ES-PB-12, ES-PL-1 and ES-PL-2**
EMISSION POINT (STACK) ID NO(S): **EP-13**	POSITION IN SERIES OF CONTROLS NO. **1** OF **1** UNITS
OPERATING SCENARIO:	
1 OF **1**	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
The bag filter will be utilized to control PM emissions from the finished product handling conveyors and screens, as well as the pellet loadout operation consisting of loading finished product from the Pellet Loadout Bins into trucks.

	PM	PM_{10}	$PM_{2.5}$	
POLLUTANTS COLLECTED:	**PM**	**PM_{10}**	**$PM_{2.5}$**	
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	**~99.0** %	**~99.0** %	**~99.0** %	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**See Emission Calculations in Appendix C**			

PRESSURE DROP (IN H_20): MIN: MAX: **6"** GAUGE? ☑ YES ☐ NO	
BULK PARTICLE DENSITY (LB/FT^3): **1.43E-05**	INLET TEMPERATURE (°F): MIN MAX **120**
POLLUTANT LOADING RATE: **0.004** ☐ LB/HR ☑ GR/FT^3	OUTLET TEMPERATURE (°F MIN MAX **100**
INLET AIR FLOW RATE (ACFM): **35,500**	FILTER OPERATING TEMP (°F): **N/A**

NO. OF COMPARTMENTS: **1**	NO. OF BAGS PER COMPARTMENT: **1**	LENGTH OF BAG (IN.): **144**
NO. OF CARTRIDGES:	FILTER SURFACE AREA PER CARTRIDGE (FT^2):	DIAMETER OF BAG (IN.): **5.75**
TOTAL FILTER SURFACE AREA (FT^2): **4,842**	AIR TO CLOTH RATIO: **7.30**	

DRAFT TYPE: ☐ INDUCED/NEGATIVE ☑ FORCED/POSITIVE FILTER MATERIAL: ☐ WOVEN ☑ FELTED

DESCRIBE CLEANING PROCEDURES:

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:
The air stream will contain wood dust particles.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	**Unknown**	
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach Additional Sheets As Necessary