NORTH CA	ROLINA DI	VISION OF			Region: Fayetteville Regional Office				
AIR QUALI	TY					County: Richmond			
	Application Review						NC Facility ID: 7700096		
		11				Inspector's Name: Joshua L. Harris			
Issue Date: J	anuary 14, 2	019				Date of Last Inspection: 11/07/2017			
		T1 114	D (			Compliance Code:	3 / Compliance - inspection		
		Facility	Data			Permit Applica	bility (this application only)		
Applicant (F	acility's Nam	e): Enviva Pelle	ets Hamlet, Ll	LC		SIP: 15A NCAC C	2Q .0300, 02D .0515, .0516,		
Facility Add	-					.0521, .0540			
Enviva Pellet	s Hamlet II <i>(</i>	<b>~</b>				<b>NSPS:</b> ISA NCAU	202D.0524 - 40 CFR Part 60,		
1125 North N	C Highway 1	- 77				NESTLAD, 15 A M	CAC 02D 1111 40 CED D		
Hamlet NC	28345	//				62 Subment 7777	CAC 02D .1111 – 40 CFK Part		
11000,110	20345					DS, Subpart ZZZZ			
<b>SIC:</b> 2499 / V	Vood Products	s. Nec				PSD Avoidance 1	54 NCAC 020, 0317 less than		
<b>NAICS: 321</b>	1999 / All Oth	er Miscellaneou	s Wood Produ	ict Manufacturi	ng	250 toy VOC			
						NC Toxics: N/A			
<b>Facility Class</b>	sification: Be	fore: Title V A	fter: Title V			112(r): N/A			
Fee Classifica	ation: Before	: Title V After	Title V			Other: N/A			
		Contact	Data			Application Data			
Facility (	Contact	Authorized	Contact	Technical (	Contact				
						Application Numb	er: 7/00096.18A		
Kai Simonsen	۱ <u> </u>	Royal Smith		Kai Simonsen	<b>Date Received:</b> 05/14/2018				
Air Permit En	gineer	EVP of Operat	ions	Air Permit Eng	gineer Application Schedule: TV- State Only				
(919) 428-028	<sup>39</sup>	(240) 482-384		(919) 428-0289	)	Existing Pormit Date			
4242 Six Fork	s Road,	7200 Wisconsi	n Avenue	4242 Six Forks	Road,	Existing Permit N	imber: 10365/R02		
Suite 1050	7600	Bethesda, MD	20814	Suite 1050		Existing Permit Ise	aue Date: 06/08/2017		
Kaleigii, NC 2	.7009			Kaleigh, NC 27	609	Existing Permit Ex	<b>piration Date:</b> 02/28/2021		
Total Actua	l emissions ir	TONS/YEAR				9			
CY SO2 NOX VOC CO			со	PM10	Total HAP	Largest HAP			
No emissions inventory on record. The emissions inventory is due June					ne 30th of e	very year.			
<b>Review Engi</b>	neer: Kevin	Godwin				Comments / Rec	ommendations:		
					Issue 10365,	/R03			
Review Engineer's Signature: Date: 1-14-19				4-19	Permit Issue Date: 01/14/2019				
Kenne T-Godan					Permit Exp	iration Date: 02/28/	2021		

#### I. Introduction and Purpose of Application

A. According to application No. 7700096.18A, Enviva Pellets Hamlet, LLC (Enviva) was initially permitted to construct a wood pellets manufacturing plant in Richmond County, North Carolina under the authorization of Prevention of Significant Deterioration (PSD) Permit No. 10365R00 on March 29, 2016. The plant is currently permitted to produce up to 537,625 oven-dried tons (ODT) per year of wood pellets utilizing up to 75% softwood on a 12-month rolling basis. The plant will consist of the following processes: Log Debarker, Log Chipper, Bark Hog, Green Wood Hammermills, Rotary Dryer, Dry Hammermills, Pellet Presses and Coolers, Product Loadout operations and other ancillary activities. Enviva has initiated onsite construction activities on the Hamlet plant but has not yet completed construction activities.

B. Enviva is submitting this permit modification application to reflect planned changes for the Hamlet plant since the submittal of the original construction permit application. These changes are being implemented to meet new customer softwood percentage and production rate demands and to incorporate emission reduction efforts. Because of these changes, the Hamlet plant will take a PSD avoidance limit and potential emissions for all criteria pollutants will be less than the PSD major source threshold of 250 tpy. The facility will continue to be classified as a major source under the 40 CFR Part 70, Title V and 40 CFR Part 63, Maximum Achievable Control Technology (MACT) programs. This application is being submitted to modify the existing PSD permit to incorporate the proposed changes and to reclassify the facility as a PSD Minor stationary source (PSD Avoidance).

This permit action will address the following changes associated with the new plant design as outlined in the application:

- 1. Increase production rate from 537,625 ODT per year to 625,011 ODT per year by upgrading pellet dies with a new prototype while increasing the amount of softwood processed from a maximum of 75% to a maximum of 85%;
- 2. Add a regenerative thermal oxidizer (CD-RTO-1) following the currently permitted Dryer wet electrostatic precipitator (CD-WESP) for volatile organic compound (VOC), HAP and particulate matter (PM) emissions control;
- 3. Install a third Green Wood Hammermill;
- 4. Remove the Green Wood Hammermill cyclones from the permit and recirculate the exhaust to either the inlet of the Dryer furnace or directly to the WESP/RTO system (CD-WESP/CD-RTO-1) to reduce VOC, HAP and PM emissions;
- 5. Following the six (6) Pellet Cooler product recovery cyclones, install one wet scrubber (CD-WSB) to reduce PM emissions;
- Add a regenerative catalytic oxidizer (CD-RCO), which can operate in thermal mode (as an RTO) for backup during catalyst cleaning, to control combined emissions of VOC, HAP and PM from the Pellet Coolers and Pellet Mills;
- 7. Decrease the amount of wood that can bypass the Dry Hammermills from 25% to 15%;
- 8. Incorporate construction of a baghouse (CD-HMC-BH) installed to control fugitive emissions that escape from the Hammermill Collection Conveyor (ES-HMC);
- 9. Add an emission point for the Pellet Cooler Low Pressure (LP) Fines Relay System (ES-PCLP) and add a corresponding baghouse (CD-PCLP-BH);
- 10. Remove the hammermill area (ES-HMA) emission point which will no longer be an emission point;
- Rename the Pellet Fines Bin (ES-PFB) and associated baghouse (CD-PFB-BV) as the Pellet Cooler High Pressure (HP) Fines Relay System (ES-PCHP) and associated baghouse (CD-PCHP-BH), respectively;
- 12. Rename the Pellet Sampling Transfer Bin (ES-PSTB) to the Pellet Dust Collection Transfer Bin (ES-PDCTB);
- 13. Change the number of Pellet Loadout Bins (ES-PB-1 to 8) from eight (8) to (2) bins (ES-PB-1 and 2);
- 14. Remove the truck loadout station (ES-PL-1 to 3) emissions point because pellets will be loaded into closed top hopper rail cars that are entirely enclosed; and
- 15. Add Additive Handling and Storage (ES-ADD) and associated baghouse (CD-ADD-BH) for storage of a powder additive to be added during pelletizing.

In addition to these physical design changes, Enviva is proposing the following changes to the previous PSD permit as part of this application:

- 16. Update site emissions to reflect planned insignificant activities including:
  - a. Adding two storage piles for a total of four Green Wood Storage Piles (IES-GWSP-1 through 4);
  - b. Adding Bark Fuel Storage Piles (IES-BFSP-1 and 2);

- c. Reclassifying the Chipper (IES-CHIP-1) and Bark Hog (IES-BARKHOG) as insignificant activities instead of as permitted equipment (previously, ES-CHIP-1 and ES-BARKHOG, respectively); and
- d. Adding Dry Shavings Handling (IES-DRYSHAVE) and storage silo to allow the facility to process dry shavings which will not require drying.
- 17. Update HAP emission factors to reflect new testing data from other similar facilities.
- 18. Bin vent filter (CD-BV) and bagfilter (CD-BF) descriptions have been changed to baghouse (CD-BH) to more accurately reflect planned control equipment to be utilized at the Hamlet plant. In addition, some control device nomenclature was updated to reference the equipment it controls to be consistent with nomenclature used for the other units in Enviva's permit (e.g. CD-DC-BF-3 is relabeled as CD-PDCTB-BH, and CD-DC-BV1 and CD-DC-BV2 are relabeled CD-DWH-BH1 and CD-DWH-BH2).
- 19. Update the emergency generator rating to a proposed rating of 671 brake horsepower (bhp) instead of the proposed 536 bhp unit referenced in the initial PSD application.
- 20. Update the Fire Pump Engine rating from 250 bhp to 131 bhp.
- 21. Cyclones on the Dry Hammermills (ES-HM-1 to 8) and Dryer (ES-DRYER) will not be used as air pollution control devices but rather are used for product recovery. Therefore, CD-HM-CYC-1 through 8 and CD-DC1 through 4 for the ES-HM-1 through 8 and ES-DRYER, respectively, should be removed from the control device description in Section 1 of the Hamlet plant's permit.

#### II. Changes to Existing Air Permit

The following changes were made to the existing Permit:

Page No.	Section	Description of Changes
N/A	Attachment – List of Insignificant Activities	Included the following sources: Log Chipping (ID No. IES-CHIP-1), Bark Hog (ID No. IES-BARKHOG), Emergency Generator (ID No. IES-GN), Fire water pump (ID No. IES-FWP), Dried shaving material handling (ID No. IES-DRYSHAVE), Bark fuel storage piles (ID No. IES-BFSP-1 and 2), Bark fuel bin (ID No. IES-BER)
		Updated storage tank capacities as follows: Diesel fuel storage tank (ID No. IES-TK-1, 1,000 gallons capacity), Diesel fuel storage tank (ID No. IES-TK-2, 185 gallons capacity), Diesel fuel storage tanks (ID No. IES-TK-3, 5,000 gallons capacity).

Page No.	Section	Description of Changes					
3	Table of Permitted Emission Sources	Removed the PSD designation throughout the table.         Included the following sources and control devices:         Hammermill collection conveyor (ID No. ES-HMC) controlled by bagfilter (ID No. CD-HMC-BH),         Pellet cooler high pressure fines relay (ID No. ES-PCHP) controlled by bagfilter (ID No. CD-PCHP-BH)					
		Pellet cooler low pressure fines relay (ID No. ES-PCLP) controlled by bagfilter (ID No. CD-PCLP-BH), Pellet dust collection transfer bin (ID No. PDCTD) controlled to Si					
		(ID No. CD-PDCTB-BH).					
		Additive handling and storage (ID No. ES-ADD) controlled by bagfilter (ID No. CD-ADD-BH).					
		Removed cyclones as control devices.					
		Removed Hammermill Area (ID No. ES-HMA) emission source.					
		Changed the Pellet Loadout Bins from eight (8) to two (2) bins (ID Nos. ES-PB-1 and 2)					
		Included new regenerative thermal oxidizer (ID No. CD-RTO-1) installed on Green wood hammermills (ID No. GMH-1 through 3) and Rotary dryer (ID No. ES-DRYER).					
		Included new wet scrubber (ID No. CD-WSB) and regenerative catalytic oxidizer (ID No. CD-RCO) installed on Pellet coolers (ID Nos. ES-CLR-1 through 6)					
		Moved the following sources to the insignificant activity list: Log Chipping (ID No. IES-CHIP-1),					
		Bark Hog (ID No. IES-BARKHOG),					
		Fire water pump (ID No. IES-GN), and					
4	2.1 A.	Updated emission source description to reflect the proposed emission source configuration.					
5	2.1 A.1	Updated the 15A NCAC 02D .0515 condition to reflect the proposed control device configuration.					
8	2.2 A.2.	Removed the existing PSD condition and replaced with a PSD avoidance condition.					

#### **III. Statement of Compliance**

The facility is currently under construction and does not have a compliance history.

#### **IV. Process Description**

The wood pellet manufacturing process description is detailed in the application as follows:

#### A. Green Wood Handling and Storage

"Green" (i.e., wet) wood will be delivered to the plant via trucks as either pre-chipped wood or unchipped logs from commercial harvesting for on-site chipping. Purchased chips and bark will be unloaded from trucks into hoppers that feed conveyors (IES-GWH) that transfer the material to Green Wood Storage Piles (IES-GWSP-1 through 4) or to Bark Fuel Storage Piles (IES-BFSP-1 and 2). Conveyors transferring green wood chips will be enclosed.

Purchased chips will be screened prior to transfer to the Green Wood Storage Piles.

#### B. Debarking, Chipping, Bark Hog, and Bark Fuel Storage Piles and Bin

Logs will be debarked by the electric-powered rotary drum Debarker (IES-DEBARK-1) and then sent to the Chipper (IES-CHIP-1) to chip the wood to specification for drying. Bark from the Debarker and purchased bark/chips will be transferred to the Bark Hog (IES-BARKHOG) via conveyor for further processing.

Material processed by the Bark Hog will be transferred to the Bark Fuel Storage Piles (IES-BFSP-1 and 2) via conveyor. The primary Bark Fuel Storage Pile (IES-BFSP-1) will be located under a covered structure. The secondary Bark Fuel Storage Pile (IES-BFSP-2) will serve as overflow storage as needed. Following storage in the Bark Fuel Storage Piles (IES-BFSP-1 and 2), the bark will be transferred via a walking floor to a covered conveyor to a fully enclosed Bark Fuel Bin (IES-BFB) where the material will be pushed into the furnace.

#### C. Green Wood Hammermills

Chipped wood used in pellet production will be further processed in the Green Wood Hammermills (ES-GHM-1, 2, and 3) to reduce material to the proper size. The facility is currently permitted to install two Green Wood Hammermills (ES-GHM-1 and 2) each with its own cyclone control device (CD-GHM-CYC1 and CD-GHM-CYC2). Enviva is now proposing to install three Green Wood Hammermills total, to remove the cyclones from the design, and to directly route the vent streams to either the inlet of the Dryer furnace (which is ultimately routed to WESP/RTO control system) or directly into the WESP/RTO control system (CD-WESP/CD-RTO-1) to control PM, VOC, and HAP emissions.

#### D. Dryer

Green wood will be conveyed to a single pass rotary Dryer system (ES-DRYER). Direct contact heat will be provided to the system via a 250.4 million Btu per hour total heat input furnace that uses bark and wood chips as fuel. Green wood will be fed into the Dryer where the moisture content will be reduced to the desired level and routed to four (4) identical product recovery cyclones operating in parallel, which will capture dried wood for further processing. Emissions from the Dryer cyclones will be combined into a common duct which will include the proposed vent from the Green Hammermills (ES-GHM-1 through 3) and routed to a WESP (CD-WESP) for additional particulate, metallic HAP, and hydrogen chloride removal. As part of this application, Enviva is proposing to install a natural gas-fired RTO (32 million Btu per hour, CD-RTO-1) following the WESP to provide further PM, VOC, and HAP emissions control.

#### E. Dried Wood Handling

Dried materials from the Dryer product recovery cyclones will be conveyed to screening operations that remove smaller wood particles. Oversized wood will be diverted to the Dry Hammermills (ES-HM-1 through 8) for further size reduction prior to pelletization, each of which will be followed by a product recovery cyclone that is controlled by a bagfilter. Smaller particles passing through the screens will bypass these hammermills and be pneumatically conveyed directly to the product recovery cyclones for the Dry Hammermills. Enviva estimates that approximately 15% of the total material leaving the Dryer will bypass the Dry Hammermills and be sent directly to the pelletizing operations. It should be noted that the current permit basis assumes 25% will bypass the Dry Hammermills.

There will be several other conveyor transfer points located between the Dryer and Dry Hammermills comprising the Dried Wood Handling (ES-DWH) emission source. These transfer points will be

completely enclosed with only two (2) emission points that will be controlled by individual bagfilters (CD-DWH-BH1 and 2).

As part of this application, Enviva is proposing to use purchased dry shavings to produce wood pellets in addition to green chips or logs, forgoing the drying process and thus lowering VOC and HAP emissions. The purchased dry shavings will be unloaded from trucks into a hopper that feeds material via enclosed conveyors to a bucket elevator that ultimately fills a silo. Each of these material transfer points will be entirely enclosed except for truck unloading (IES-DRYSHAVE). From the silo, the dry shavings will then be transferred via an enclosed screw conveyor to the Dry Hammermills for additional processing.

#### F. Dry Hammermills

Prior to pelletization, dried wood is reduced to the appropriate size using eight (8) Dry Hammermills operating in parallel (ES-HM-1 through ES-HM-8). Each Dry Hammermill will include a product recovery cyclone for capturing additional dried wood for further processing. Particulate emissions from each of the Dry Hammermills will be controlled using individual bagfilters (CD-HM-BH1 through 8).

#### G. Hammermill Conveyors

The Hammermill Conveyors (ES-HMC) will transport material from the product recovery cyclones associated with the Dry Hammermills (ES-HM-1 through 8) to the pelletizing process. Emissions from the Hammermill Conveyors will be captured and controlled by the Hammermill Conveyor bagfilter (CD-HMC-BH).

#### H. Pellet Mill Feed Silo

Sized wood from the Dry Hammermill product recovery cyclones will be 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 will be controlled by a bagfilter (CD-PMFS-BH).

#### I. Additive Handling and Storage

Additive will be used in the pellet production process to increase the durability of the final product. The additive will be added to sized 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.

Bulk additive material will be delivered by truck and pneumatically unloaded into a storage silo (ES-ADD) equipped with a bagfilter (CD-ADD-BH) to control emissions from air displaced during the loading of additive material to the silo. The additive will then be conveyed via screw conveyor from the storage silo to the milled fiber conveyor which transfers milled wood to the Pellet Presses.

#### J. Pellet Press System and Pellet Coolers

Dried processed wood will be mechanically compacted through pellet press dies. Exhaust from the Pellet Press System and Pellet Press conveyors will be vented through the Pellet Cooler aspiration material recovery cyclones and pollutant controls as described below, and then to the atmosphere. No resin or other chemical binding agents are needed for pelletization. As discussed in Section 1, Enviva is proposing to increase the permitted production rate from 537,625 ODT per year to 625,011 ODT per year by upgrading the design of the pellet dies to use a new prototype.

Formed pellets will be discharged into one of six (6) Pellet Coolers (ES-CLR-1 through ES-CLR-6) where cooling air will be passed through the pellets. At this point, the pellets will contain a small amount of wood fines which will be swept out with the cooling air and controlled utilizing a single wet scrubber (CD-WSB).

The exhaust from the scrubber will then be sent to a natural gas-fired RCO (CD-RCO) for control of VOC, HAP, and PM. The RCO will also be able to operate in thermal mode during catalyst cleaning.

An aspiration system will be used to recirculate air for the pellet coolers. Emissions from the Pellet Cooler LP Fines Relay System (ES-PCLP) will be controlled by a bagfilter (CD-PCLP-BH). A second aspiration system, referred to as the Pellet Cooler HP Fines Relay System (ES-PCHP), will pull collected fines from the Pellet Cooler screens and from the Pellet Cooler LP Fines Relay System baghouse to the associated bagfilter (CD-PCHP-BH). From the collection system, the fines will be reintroduced to the Pellet Presses for re-use in the process.

The final product, wood pellets, will be transferred from the Pellet Coolers to the rail loadout operation via a conveyor that will be controlled by the Pellet Dust Collection Transfer Bin (ES-PDCTB) bagfilter (CD-PDCTB-BH).

#### K. Finished Product Handling and Loadout

Final product will be conveyed to two storage bins (ES-PB-1 and ES-PB-2) that will feed a rail loadout station. At the rail loadout station, pellets will be gravity fed into closed top rail cars. Atmospheric emissions from pellet loadout will be minimal because dried wood fines will have been removed in the pellet screener, and a slight negative pressure will be maintained in the loadout building as a fire prevention measure to prevent any buildup of dust on surfaces within the building. This slight negative pressure will be produced via an induced draft fan that will exhaust to the Finished Product Handling bagfilter (CD-FPH-BH). This bagfilter will control emissions from Finished Product Handling (ES-FPH) and the two (2) Pellet Loadout Bins (ES-PB-1 to ES-PB-2). Rail car loading will be entirely enclosed because material will be loaded into closed top hopper cars.

#### L. Emergency Generator, Fire Water Pump Engine, and Diesel Storage Tanks

The plant will have a 671 brake horsepower (bhp) diesel-fired Emergency Generator (IES-GN) for emergency operations and a 131 bhp diesel-fired Fire Water Pump Engine (IES-FWP). Aside from maintenance and readiness testing, the generator and fire water pump engines will only be utilized for emergency operations.

Diesel for the emergency generator will be stored in a tank of up to 1,000 gallons capacity (IES-TK-1) and diesel for the fire water pump engine will be stored in a storage tank of up to 185 gallons capacity (IES-TK-2). The plant will also have a third diesel storage tank with a capacity of up to 5,000 gallons (IES-TK-3) for distributing diesel fuel to mobile equipment.

#### V. Emissions

The following table provides a summary of Facility-wide criteria pollutant emissions

			Table 2		A	1000 Ten 101 1 1 1 10 10					
		Summar	y of Facility-wide Pote	ntial Emis	sions						
			Enviva Pellets Hamlet	, LLC							
		Hamle	t, Richmond County, No	orth Carol	Ina				-		
			]	ſ	1	T	-			1	
Emission Unit ID	Source Description	Control Device ID	Control Device Description	CO (tpy)	NO <sub>x</sub> (tpy)	PM (tpy)	PM <sub>10</sub> (tpy)	РМ <sub>2.5</sub> (фу)	SO2 (tpy)	VOC (tpy)	CO <sub>2</sub> e (tpy)
IES-CHIP-1	Log Chipping									1.6	
IES-BARKHOG	Bark Hog					0.23	0.13			0.28	
ES-DRYER	Direct Heat Drying System	CD-WESP	WESP; RTO	219	219	33	33	33	27	39	243 754
ES-GHM-1 through 3	Hammermills	CD-RIO-I									240,754
ES-HM-1 through 8	Eight (8) Dry Hammermills	CD-HM-BH1 through 8	Eight (8) baghouses			18	18	0.31		135	
ES-HMC	Hammermill Collection Conveyor	CD-HMC-BH	One (1) baghouse			0.23	0.23	0.23			
ES-PCHP	Pellet Cooler HP Fines Relay System	CD-PCHP-BH	One (1) baghouse			0.075	0.075	0.075			
ES-PCLP	System	CD-PCLP-BH	One (1) baghouse			0.47	0.47	0.47			
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BH	One (1) baghouse			0.37	0.37	0.37			***
ES-CLR-1 through 6 <sup>1</sup>	-1 through 6 <sup>1</sup> Six (6) Pellet Coolers CD-CLR-1 (or CD- CD-R-1 (or CD-		Six (6) baghouses (one on each cooler) or wet scrubber: RCO	12	15	15	4.6	1.5	0.082	24	20,683
ES-DCTB	Pellet Dust Collection Transfer Bin	CD-PDCTB-BH	One (1) baghouse			0.45	0,45	0.45			
ES-FPH ES-PB-1 and 2	Finished Product Handling	CD-FPH-BH	One (1) baghouse			1.3	1.2	0.022			
	Dried Wood Handling							- CHORE			
C3-DWH	Operations	CD-DWH-BH1 and 2	Two (2) baghouses			0.30	0.30	0.30		39	
ES-ADD	Additive Handling and Storage	CD-ADD-BH	One (1) baghouse			0.15	0.15	0.15			
IES-GWH	Green Wood Handling Operations					0.077	0.036	0.0055	-		
IES-TK-1	1,000 gallon Diesel Storage Tank							**		0.00058	
IES-TK-2	Tank									0.00016	
IES-TK-3	Tank	-	-							0.0033	
IES-BESP-1 and 2	Bark Fuel Storage Piles					13	6.7	1.0		6.9	
IES-DRYSHAVE	Dry Shaving Material Handling					0.56	0.28	0.042		0.29	-
IES-DEBARK-1	Debarker					1.1	0.59				
IES-BFB <sup>2</sup>	Bark Fuel Bin										
IES-GN	500 kW Diesel-fired Emergency Generator			0.14	2.5	0.0078	0.0078	0.0078	0.00066	1.7	179
IES-FWP	250 hp Diesel-fired Fire Water Pump			0.070	0.18	0.0092	0.0092	0.0092	0.00048	0.0081	50
	Paved Roads			-		16	3.2	0.78			
			Total Emissions:	231	236	100	70	39	28	248	264,666
		Total	Excluding Fugitives <sup>3</sup> :	231	236	71	60	37	28	241	264,666
		PSD Ma	jor Source Threshold:	250	250	250	250	250	250	250	
			-					1		1	

tes: The pellet coolers will be equipped with either six (6) baghouses (one on each cooler) or a single wet scrubber for PM control. The emissions are expected to be the same whether the scrubber or baghouses are installed. In addition, the pellet coolers will be equipped with an RCO for VOC control that will operate primarily in catalytic mode with thermal (RTO) mode as a backup. The RTO and RCO modes have the same control efficiency so there will be no impact on emissions during thermal mode usage. Bark is transferred from the primary Bark Fuel Storage Pile by walking floor to covered conveyors which transfer the bark into the full enclosed Bark Fuel Bin. There are no emissions expected from transfer of material into the bin.

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.

breviations:	
ES - Emission Source	PM <sub>2.5</sub> - particulate matter with an aerodynamic diameter of 2.5 microns or less
IES - Insignificant Emission Source	RTO - Regenerative Thermal OxIdizer
CO - carbon monoxide	SO <sub>2</sub> - sulfur dioxide
CO2e - carbon dioxide equivalent	tpy - tons per year
NO <sub>x</sub> - nítrogen oxides	VOC - volatile organic compounds
PM - particulate matter	WESP - Wet Electrostatic Precipitator
PM10 - particulate matter with an aerodynamic diameter less than 10 microns	

Copies of detailed potential emissions calculations spreadsheets are included in Attachment 1 of this document and in the application, Appendix C.

A. Green Wood Handling (IES-GWH)

Fugitive PM emissions will result from unloading purchased chips and bark from trucks into hoppers and 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*.<sup>1</sup> Chip conveyors are enclosed; therefore, emissions were only quantified for the final drop points (i.e., from conveyor to pile). Bark conveyors will not be enclosed; however, due to the large size of this material any fugitive PM emissions occurring along the conveyor itself will be negligible. As such, emissions were only quantified for the final drop points (i.e., from conveyor to pile).

Green wood and bark contain a high moisture content approaching 50 percent water by weight. Therefore, Green Wood Handling will have insignificant PM emissions. Per 15A NCAC 02Q .0503(8), Green Wood Handling (IES-GWH) is an insignificant activity, because potential uncontrolled PM emissions are less than 5 tpy.

B. Green Wood Storage Piles (IES-GWSP-1 through 4) and Bark Fuel Storage Piles (IES-BFSP-1 and 2) Particulate emission factors used to quantify emissions from storage pile wind erosion for the four (4) Green Wood Storage Piles and two (2) Bark Fuel Storage Piles were calculated based on USEPA's Control of Open Fugitive Dust Sources.<sup>2</sup> The number of days with rainfall greater than 0.01 inches was obtained from AP-42 Section 13.2.2, Unpaved Roads<sup>3</sup>, 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<sup>4</sup>. 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.

Per 15A NCAC 02Q .0503(8), the Green Wood Storage Piles (IES-GWSP-1 through 4) and the Bark Fuel Storage Piles (IES-BFSP-1 and 2) are insignificant activities based on each having potential uncontrolled PM and VOC emissions less than 5 tpy.

C. Debarker (IES-DEBARK-1)

PM emissions will occur as a result of log debarking. Potential PM emissions from debarking were quantified based on emission factors from EPA's *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants* for Source Classification Code (SCC) 3-07-008-01 (Log Debarking).<sup>5</sup> All PM was assumed to be larger than 2.5 microns in diameter. PM emissions from debarking will be minimal due to the high moisture content of green wood (~50%) and the fact that the

<sup>&</sup>lt;sup>1</sup> USEPA AP-42 Section 13.2.4, Aggregate Handling and Storage Piles (11/06).

<sup>&</sup>lt;sup>2</sup> USEPA Control of Open Fugitive Dust Sources, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.

<sup>&</sup>lt;sup>3</sup> USEPA AP-42 Section 13.2.2, Unpaved Roads (11/06).

<sup>&</sup>lt;sup>4</sup> Data provided via email to Aubrey Jones (Ramboll) by Matthew Porter (NC DAQ) on July 27, 2017.

<sup>&</sup>lt;sup>5</sup> 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.

debarking drum will be enclosed, except for the two ends where logs enter and material exits after debarking. A 90% control efficiency was applied for partial enclosure.

The Debarker is considered an insignificant activity per 15A NCAC 02Q .0503(8) due to potential uncontrolled PM emissions less than 5 tpy.

#### D. Bark Hog (IES-BARKHOG)

Processing of bark by the Bark Hog will result in emissions of PM, VOC, and methanol. Particulate emission factors were not available for this specific operation; therefore, potential PM emissions were quantified based on emission factors from EPA's *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants* for log debarking (SCC 3-07-008-01).<sup>6</sup> The Bark Hog is primarily enclosed and thus has minimal PM emissions. 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*.<sup>7</sup>

The Bark Hog is considered an insignificant activity per 15A NCAC 02Q .0503(8) due to potential uncontrolled emissions less than 5 tpy.

#### E. Chipper (IES-CHIP-1)

The Chipper will be located inside of a building; therefore, PM emissions will be negligible and were not quantified. The chipping process will also result in emissions of VOC and methanol. VOC and methanol emissions were quantified based on emission factors for log chipping from AP-42 Section 10.6.3, *Medium Density Fiberboard*.<sup>8</sup>

The Chipper is considered an insignificant activity per 15A NCAC 02Q .0503(8) due to potential uncontrolled emissions less than 5 tpy.

#### F. Bark Fuel Bin (IES-BFB)

Bark will be transferred from the Bark Fuel Storage Piles via a walking floor to a covered conveyor and then to the fully enclosed Bark Fuel Bin (IES-BFB). Due to complete enclosure of the Bark Fuel Bin, emissions from transfer of material into the bin were not explicitly quantified. Per 15A NCAC 02Q .0503(8), the Bark Fuel Bin is an insignificant activity due to potential uncontrolled PM emissions less than 5 tpy.<sup>9</sup>

#### G. Dryer (ES-DRYER) and Green Wood Hammermills (ES-GHM-1 through 3)

Exhaust from the Dryer and Green Wood Hammermills will be routed to a WESP/RTO control system for control of PM, VOC, and HAP. Potential emissions of PM, PM less than 10 microns in diameter ( $PM_{10}$ ), PM less than 2.5 microns in diameter ( $PM_{2.5}$ ), carbon monoxide (CO) and oxides of nitrogen ( $NO_X$ ), including NO<sub>x</sub> and CO emissions generated during thermal oxidation, are based on guaranteed pound per hour (lb/hr) emission rates provided by the RTO vendor. Potential emissions of sulfur dioxide (SO<sub>2</sub>) were calculated based on an emission factor from AP-42 Section 10.6.2, *Particle Board Manufacturing*.<sup>10</sup> VOC emissions were calculated using an emission factor derived from stack testing conducted at Enviva and other similar wood pellet manufacturing facilities.

<sup>&</sup>lt;sup>6</sup> Ibid.

<sup>&</sup>lt;sup>7</sup> USEPA AP-42 Section 10.6.3, Medium Density Fiberboard Manufacturing (08/02).

<sup>&</sup>lt;sup>8</sup> Ibid.

<sup>&</sup>lt;sup>9</sup> Due to complete enclosure of the Bark Fuel Bin, emissions were not quantified.

<sup>&</sup>lt;sup>10</sup> USEPA AP-42 Section 10.6.2, Particle Board Manufacturing (6/02).

HAP and toxics air pollutant (TAP) emissions were calculated based on emission factors from several data sources including stack testing data from other similar facilities, emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*<sup>11</sup>, and NC DAQ's Wood Waste Combustion Spreadsheet<sup>12</sup>. HAP emissions from natural gas combustion by the RTO burners were calculated based on AP-42 Section 1.4, *Natural Gas Combustion*.<sup>13</sup>

Combustion of wood by the Dryer furnace and natural gas by the RTO burners will also result in emissions of GHG. The emissions were quantified based on emission factors from AP-42, Section 10.6.1 for a rotary dryer with an RTO control device. Enviva has conservatively calculated the  $CO_2$  emissions using the higher hardwood emission factor because the dryer at the Hamlet facility will use a combination of hardwood and softwood.

#### H. Dried Wood Handling (ES-DWH)

ES-DWH will include conveyor transfer points located between the Dryer and Dry Hammermills with emissions controlled by two (2) bagfilters (CD-DWH-BH-1 and 2). PM emissions from these bagfilters were calculated based on manufacturer guaranteed exit grain loading rates and the maximum nominal exhaust flow rate of the baghouses.

Additionally, the dried material may continue to emit VOC and HAP as it is transferred between the Dryer and Dry Hammermills due to the elevated temperature of the material. Potential VOC and HAP emissions were calculated based on NCASI dry wood handling emission factors.<sup>14</sup>

#### I. Dry Shavings Handling (IES-DRYSHAVE)

Particulate emissions will occur during unloading of dry shavings from trucks and may also occur because of air displaced during silo loading. Potential emissions were calculated based on AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*.<sup>15</sup> Dry shavings will be transferred into the new dry shavings silo via an enclosed bucket elevator. Because the actual transfer will be enclosed within the silo, a 90% control efficiency was applied for this material transfer point.

Per 15A NCAC 02Q .0503(8), Dry Shavings Handling (IES-DRYSHAVE) is considered an insignificant activity because potential uncontrolled PM emissions are less than 5 tpy.

#### J. Dry Hammermills (ES-HM-1 through 8)

The Dry Hammermills will generate PM, VOC, and HAP emissions during the process of reducing wood chips to the required size. PM emissions from the Dry Hammermills will be controlled using individual bagfilters (CD-HM-BH-1 through 8). Particulate emissions from each bagfilter were calculated using a manufacturer guaranteed exit grain loading rate and the maximum nominal exhaust flow rate of the bagfilter.

VOC and HAP emissions were calculated based on stack testing data from comparable Enviva facilities.

<sup>&</sup>lt;sup>11</sup> USEPA AP-42 Section 1.6, Wood Residue Combustion in Boilers (09/03).

<sup>&</sup>lt;sup>12</sup> 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.

<sup>&</sup>lt;sup>13</sup> USEPA AP-42 Section 1.4, Natural Gas Combustion (07/98).

<sup>14</sup> NCASI VOC Dry Wood handling factor based oriented-strand board operations.

<sup>&</sup>lt;sup>15</sup> USEPA AP-42 Section 13.2.4, Aggregate Handling and Storage Piles (11/06).

- K. Pellet Cooler HP Fines Relay System (ES-PCHP) and Pellet Cooler LP Fines Relay System (ES-PCLP) An induced draft fan will be used to transfer dust generated from a number of enclosed transfer/handling sources around the Dry Hammermill Area to the Pellet Cooler HP Fines Relay System, controlled by a bagfilter (CD-PCHP-BH). PM emissions from this bagfilter, which will control emissions from ES-PCHP, were calculated based on a manufacturer guaranteed exit grain loading rate and the maximum nominal exhaust flow rate of the bagfilter. A second bagfilter (CD-PCLP-BH) will control emissions from Pellet Cooler LP Fines Relay System (ES-PCLP) and PM emissions were calculated based on a manufacturer guaranteed exit grain loading rate and the maximum nominal exhaust flow rate of the bagfilter.
- L. Dry Hammermill Conveying System (ES-HMC)

Fugitive PM emissions that escape the Hammermill Collection Conveyor will be controlled by a bagfilter (CD-HMC-BH). PM emissions from this baghouse were calculated based on a manufacturer guaranteed exit grain loading rate and the maximum nominal exhaust flow rate of the bagfilter.

M. Pellet Mill Feed Silo (ES-PMFS)

The Pellet Mill Feed Silo will be equipped with a bagfilter (CD-PMFS-BH) to control PM emissions associated with silo loading and unloading operations. PM emissions are calculated based on a manufacturer guaranteed exit grain loading rate and the maximum nominal exhaust flow rate of the bagfilter.

N. Additive Handling and Storage (ES-ADD)

An additive will be used in the pellet production process to increase the durability of the final product. Material will be pneumatically conveyed from the delivery trucks to the storage silo equipped with a bagfilter (CD-ADD-BH). PM emissions from the bagfilter were calculated based on an assumed exit grain loading rate and the maximum nominal exhaust flow rate of the baghouse.

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

Pellet Press and Pellet Cooler operations will generate PM, HAP, and VOC emissions during the forming and cooling of wood pellets. The Pellet Mill and Coolers will be equipped with a single wet scrubber (CD-WSB) for PM control, followed by an RCO (CD-RCO) for VOC and HAP control from the exhaust of the scrubber. The oxidizer will operate in thermal mode as an RTO during catalyst cleaning. 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 proposed bagfilters.

Uncontrolled VOC and HAP emissions at the outlet of the Pellet Cooler wet scrubber (CD-WSB) were quantified based on stack testing data from comparable Enviva plants. This includes emissions from both the Pellet Mills and the Pellet Coolers. Controlled emissions were estimated based on a 95% control efficiency for the RCO. Operation in thermal mode will achieve the same control efficiency and will have no impact on the calculated emissions. NO<sub>x</sub> and CO emissions resulting from thermal oxidation were calculated using AP-42 Section 1.4, *Natural Gas Combustion*<sup>16</sup>, and the maximum high heating value of the anticipated VOC constituents.

Emissions of criteria pollutants, HAP, and TAP from natural gas combustion by the RCO burners were estimated using emission factors from AP-42 Section 1.4. Potential GHG emissions from natural gas combustion were quantified based on emission factors from Subpart C of 40 CFR Part 98. Emissions were converted to carbon dioxide equivalent (CO<sub>2</sub>e) based on Global Warming Potentials from Subpart A of 40 CFR 98.

<sup>&</sup>lt;sup>16</sup> USEPA AP-42 Section 1.4, Natural Gas Combustion (07/98).

#### P. Pellet Dust Collection Transfer Bin (ES-PDCTB)

PM emissions will occur during transfer of wood pellets into the Pellet Dust Collection Transfer Bin. Particulate emissions from the bagfilters that controls the Pellet Dust Collection Transfer Bin (CD-PDCTB-BH) were calculated assuming a manufacturer guaranteed exit grain loading rate and the maximum nominal exhaust flow rate of the bagfilter.

#### Q. Pellet Loadout Bins (ES-PB-1 through 2) and Finished Product Handling (ES-FPH)

PM emissions result from the transfer of finished product to the Pellet Loadout Bins. No emissions are anticipated for the transfer of pellets from the bins to rail cars because wood pellets will be loaded into closed top rail cars that are entirely enclosed. PM emissions from Finished Product Handling and the two (2) Pellet Loadout Bins will be controlled by a bagfilter (CD-FPH-BH). 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 bagfilter.

#### R. Emergency Generator (IES-GN) and Fire Water Pump Engine (IES-FWP)

Operation of the Emergency Generator and Fire Water Pump will generate emissions of criteria pollutants, HAP, and GHG. Potential PM, NO<sub>X</sub>, VOC, and CO emissions from operation of the Emergency Generator and Fire Water Pump Engine were calculated based on emission factors from their respective manufacturer specification sheets and the maximum horsepower rating of the engines. VOC emissions were calculated based on the manufacturer's emission factor for hydrocarbons. Potential SO<sub>2</sub> emissions 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<sub>2</sub> air emissions.<sup>17</sup> Potential HAP emissions were quantified based on emission factors from AP-42 Section 3.3, *Stationary Internal Combustion Engines*.<sup>18</sup> Annual potential emissions were conservatively calculated based on 500 hours per year.

Combustion of diesel fuel by the engines will also result in emissions of GHG. Potential GHG emissions from each engine were quantified based on emission factors from Subpart C of 40 CFR Part 98. Emissions were converted to  $CO_2e$  based on Global Warming Potentials from Subpart A of 40 CFR 98.

The Emergency Generator and Fire Water Pump Engine qualify as insignificant activities pursuant to 15A NCAC 02Q .0503(8).

#### S. Diesel Storage Tanks (IES-TK-1 through 3)

The storage of diesel in on-site storage tanks will generate emissions of VOC. VOC emissions from the three (3) Diesel Storage Tanks were calculated using EPA's TANKS 4.0 software 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(8) they are listed as insignificant sources in the permit.

T. Paved Roads

Fugitive PM emissions will occur as a result of trucks and employee vehicles traveling on paved roads on the Hamlet plant property. Emission factors were calculated based on Equation 2 from AP-42 Section 13.2.1, *Paved Roads*<sup>19</sup> using the mean silt loading for quarries (8.2 g/m<sup>2</sup>) and 110 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

<sup>&</sup>lt;sup>17</sup> Sulfur content in accordance with Year 2010 standards of 40 CFR 80.510(b) as required by NSPS Subpart IIII.

<sup>&</sup>lt;sup>18</sup> USEPA AP-42 Section 3.3, Stationary Internal Combustion Engines (10/96).

<sup>&</sup>lt;sup>19</sup> USEPA AP-42 Section 13.2.1, Paved Roads (01/11).

activities followed by sweeping. This control efficiency is based on data from the *Air Pollution Engineering Manual* of the Air and Waste Management Association.

#### VI. Regulatory Review - Specific Emission Source Limitations and Conditions

A. <u>15A NCAC 02D .0515 "Particulates from Miscellaneous Industrial Processes"</u> – This regulation establishes an allowable emission rate for particulate matter from any stack, vent, or outlet resulting from any industrial process for which no other emission control standards are applicable. This regulation applies to Total Suspended Particulate (TSP) or PM less than 100 micrometers (μm). The allowable emission rate is calculated using the following equation:

$E = 4.10 \text{ x } P^{0.67}$	for $P < 30$ tph				
E = 55 x P <sup>0.11</sup> - 40	for $P \ge 30$ tph				
	where,	E = allowable emission rate (lb/hr) P = process weight rate (tph)			

According to the application, the most significant source of PM emissions is the dryer system operating at 80 ODT/hr. The allowable emission rate is calculated to be 49.1 lb/hr. Maximum PM emission rate estimate is provided by the dryer vendor. The maximum hourly controlled emission rate is 7.6 lb/hr. Therefore, compliance is indicated.

The wet electrostatic precipitator (WESP) removes particles from a gas stream through the use of electrical forces. Discharge electrodes apply a negative charge to particles passing through a strong electrical field. These charged particles then migrate to a collecting electrode having an opposite, or positive, charge. Collected particles are removed from the collecting electrodes by washing using a mild hydroxide solution to prevent buildup of resinous materials present in the dryer exhaust. According to the application, the WESP possesses 29,904 square feet of collection plate area and can handle a maximum air flow of 230,000 acfm.

#### Control Device Monitoring

#### For bagfilters:

To assure compliance, the Permittee shall perform inspections and maintenance as recommended by the manufacturer. In addition to the manufacturer's inspection and maintenance recommendations, or if there are no manufacturer's inspection and maintenance recommendations, as a minimum, the inspection and maintenance requirement shall include the following:

- i. a monthly visual inspection of the system ductwork and material collection unit for leaks, and
- ii. an annual (for each 12-month period following the initial inspection) internal inspection of the bagfilters' structural integrity.

#### For WESP:

To assure compliance, the Permittee shall perform inspections and maintenance as recommended by the manufacturer. In addition to the manufacturer's inspection and maintenance recommendations, or if there are no manufacturer's inspection and maintenance recommendations, as a minimum, the inspection and maintenance requirement shall include the following:

The Permittee shall establish the minimum primary voltage and minimum current within the first 30 days following operation of the dryer. To assure compliance and effective operation of the wet electrostatic precipitator, the Permittee shall monitor and record the primary voltage and current through the precipitator daily. The daily observation must be made for each day of the calendar year period. The Permittee shall be allowed three (3) days of absent observations per semi-annual period.

Because the application relies on vendor guaranteed emission factors and does not include estimated control efficiency, performance testing will be required to establish control efficiency within 90 days of commencement of operation.

- B. <u>15A NCAC 02D .0516 "Sulfur Dioxide Emissions from Combustion Sources"</u> Under this regulation, sulfur dioxide emissions from combustion sources cannot exceed 2.3 lb/million Btu heat input. Wood is fired in the dryer and low sulfur diesel is combusted in the two emergency engines. Diesel is the worst-case fuel. Firing diesel fuel (0.5% sulfur by weight) will not cause this limit to be exceeded. Therefore, compliance is indicated.
- C. <u>15A NCAC 02D .0521 "Control of Visible Emissions"</u> This regulation establishes a visible emission standard for sources based on the manufacture date. For sources manufactured after July 1, 1971, the standard is 20% opacity when averaged over a 6-minute period. The Permittee will be required to establish 'normal' visible emissions from these sources within the first 30-days of the permit effective date. In order to demonstrate compliance, the Permittee will be required to observe actual visible emissions on a monthly basis for comparison to 'normal'. If emissions are observed outside of 'normal', the Permittee shall take corrective action. Recordkeeping and reporting are required. Because all emission sources are designed to be well controlled, compliance with this standard is expected.

#### VII. Regulatory Review – Multiple Emission Source Limitations and Conditions

A. <u>15A NCAC 02D .0524 "New Source Performance Standards (NSPS), Subpart IIII"</u> – This regulation applies to owners or operators of compression ignition (CI) reciprocating internal combustion engines (RICE) manufactured after April 1, 2006 that are not fire pump engines, and fire pump engines manufactured after July 1, 2006. Both the 671 hp emergency generator and the 131 hp fire pump engine are subject to the requirements of this regulation.

Under NSPS Subpart IIII, owners or operators of emergency generators manufactured in 2007 or later with a maximum engine power greater than or equal to 50 hp are required to comply with the with the emission standards for new nonroad CI engines in §60.4202, for all pollutants, for the same model year and maximum engine power for their 2007 model year and later emergency stationary CI ICE. These limits are as follows: 0.20 g/kW for PM; 3.5 g/kW for CO; and 4 g/kW for NOx + nonmethane hydrocarbons (NMHC).

Under NSPS Subpart IIII, owners or operators of fire pump engines manufactured after July 1, 2006 must comply with the emission limits in Table 4 of the subpart. The limits are as follows: 0.30 g/kW for PM and 4 g/kW for NOx + NMHC.

As stated in the application, Enviva will comply with these limits by operating the engines as instructed in the manufacturer's operating manual in accordance with 40 CFR 60.4211(a), and purchasing an engine certified to meet the referenced emission limits in accordance with 40 CFR 60.4211(b). The engines will be equipped with a non-resettable hour meter in accordance with 40 CFR 60.4209(a). Emergency and readiness testing will be limited to 100 hours per year.

In addition, both engines are required to comply with fuel requirements in 40 CFR 60.4207, which limit sulfur content to a maximum of 15 ppm and a cetane index of at least 40.

- B. <u>15A NCAC 02D .1111 "Maximum Achievable Control Technology, Subpart ZZZZ"</u> 40 CFR Part 63 applies to RICE located at a major or area source of hazardous air pollutants (HAP). Pursuant to 40 CFR §63.6590(c) (amended January 30, 2013), a new stationary RICE located at a major source must meet the requirements of this part by meeting the requirements of 40 CFR Part 60 Subpart IIII for compression ignition engines. No further requirements apply to such engines under this part.
- C. <u>15A NCAC 02D .1111 "Maximum Achievable Control Technology, 112(g)"</u> 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). Because Wood Pellet Manufacturing Plants are not a regulated source category under 40 CFR 63, the Hamlet plant was subject to 112(g) and underwent a case-by-case MACT analysis pursuant to 40 CFR 63 Subpart B as part of the initial PSD construction permitting process. NC DAQ concluded that case-by-case MACT was use of a low HAP-emitting design for the Dryer (ES-DRYER) without the addition of add-on controls, and that the Hamlet plant was not subject to numeric HAP emission limits under Section 112(g).<sup>20</sup> While not required under case-by-case MACT, the plant is subject to other requirements that have the ancillary benefit of reducing HAP emissions such as a limitation on softwood to reduce VOC emissions, RTO control on the green wood hammermills and dryer, and RCO/RTO control on the pellet coolers. Previous BACT requirements include a limitation on PM from the Dryer achieved through use of a WESP, that provides control of metallic and inorganic HAP emissions resulting from wood combustion in the furnace. Although BACT will no longer be applicable since the plant will now be a synthetic minor source with respect to PSD, Enviva is still proposing to install and operate the WESP.

Enviva has initiated construction activities at the Hamlet plant but has not yet completed construction. The proposed permit modifications outlined in this application include changes to the wood pellet manufacturing process that will decrease total potential HAP emissions by approximately 126 tpy. 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 regulation defines "construct a major source" as the fabrication, erection, or installation of a **new** greenfield site emitting greater than the HAP major source thresholds, or of a new process or production unit at an existing site, provided the new process or production unit in and of itself emits above the HAP major source thresholds.<sup>21</sup> The rule further defines process or production unit as "any collection of structures and/or equipment that processes, assembles, applies, or otherwise uses material inputs to produce or store an intermediate or final product [bold emphasis added].<sup>22</sup>

Since Enviva has already commenced construction of the Hamlet plant under the currently effective PSD permit, the proposed project does not constitute construction of a greenfield site as defined in §63.41. Furthermore, the proposed changes to the plant design do not constitute reconstruction of a major source. Per §63.41, reconstruction is defined as the replacement of components at an existing process or production unit such that the fixed capital cost of the new components exceeds 50% of that which would be required to construct a comparable new process or production unit. The "process or production unit" at the Hamlet plant is the collection of all equipment used to manufacture the wood pellet product. The fixed capital costs associated with the proposed project are significantly less than 50% of the fixed capital costs that would be required to construct a comparable new wood pellet manufacturing facility. As such, the project also does not constitute reconstruction of the process or production unit.

Based on this review, the proposed project does not trigger a requirement to perform a new case-by-case MACT evaluation under Section 112(g), as the project does not constitute construction of a major source or reconstruction of the process or production unit.

As part of the proposed project, Enviva is requesting an increase in the maximum amount of softwood that can be used from 75% up to a maximum of 85%. However, Enviva is also proposing to install an RTO to

<sup>&</sup>lt;sup>20</sup> Air Quality Permit No. 10365R02, Section 2.1.A, Condition 4

<sup>&</sup>lt;sup>21</sup> §63.41

<sup>22</sup> Ibid.

follow the WESP for the Dryer exhaust which will significantly reduce emissions of VOC and organic HAP. In addition, the exhaust stream from the Green Wood Hammermills (ES-GHM-1 to 3) will be routed to either the inlet of the Dryer furnace or directly to the WESP/RTO system (CD-WESP/CD-RTO-1), which will control VOC and organic HAP emissions from the Green Wood Hammermills. Enviva is proposing to install an RCO (with RTO backup) to control VOC and organic HAP emissions from the twelve (12) Pellet Mills and six (6) Pellet Coolers (ES-CLR-1 through 6). With the installation of the RTO and RCO, Enviva will surpass the level of control required under the original case-by-case MACT determination for the Hamlet plant and believes the intent of the original case-by-case MACT determination continues to be satisfied after completion of the proposed project.

Other sources of organic HAP emissions at the plant include the following: Log Chipper (IES-CHIP-1), the Bark Hog (IES-BARKHOG), Dried Wood Handling (ES-DWH), and eight (8) Dry Hammermills (ES-HM-1 through 8) as well as the Emergency Generator (IES-GEN) and Fire Water Pump (IES-FWP). For these sources, MACT was determined to be good process design and maintenance of equipment in accordance with manufacturer specifications and/or standard industry practices. Enviva is not requesting any modifications to the existing MACT determinations for these process sources.

Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall establish emission factors for HAPs by conducting an initial performance test on the wood-fired direct heat drying system (ID No. ES-DRYER), the green wood hammermills (ID Nos. ES-GHM-1, ES-GHM-2, and ES-GHM-3), the dry hammermills (ID Nos. ES-HM-1 to ES-HM-8), the dry wood handling operations (ID Nos. ES-DWH), and the pellet presses and coolers (ID Nos. ES-CLR-1 through ES-CLR-6).

The pollutants and emission sources to be tested during the initial performance test are listed in the following table:

Emission Source	Pollutant
Dryer system/greenwood	Acetaldehyde
hammermills	Acrolein
controlled via a RTO	Formaldehyde
Pellet coolers pellet presses	Methanol
controlled via a RCO	Phenol
One dry hammermill	Propionaldehyde
Dry wood handling operations	]

Periodic performance testing, monitoring, recordkeeping, and reporting are required according to the PSD Avoidance Condition.

- D. <u>Compliance Assurance Monitoring (CAM)</u> This permit (revision R03) is a non-Title V permit and CAM will be addressed at the time the Title V permit is developed.
- E. <u>15A NCAC 02Q .0317 "Avoidance Conditions" for avoidance of 15A NCAC 02D .0530 "Prevention of Significant Deterioration"</u> The facility has requested enforceable limits so that emissions of VOC, NOx, and CO remain below the 250 tpy PSD major source threshold. The facility will be limited to an annual process rate 625,011 ODT/year on a rolling 12-month average basis, with a maximum 85% softwood and use an RTO and RCO to control VOC emissions. A condition is included in the permit with the limits and restrictions necessary not to exceed those limits.

Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the PSD avoidance limits by conducting an initial performance test on the wood-fired direct heat drying system (ID No. ES-DRYER), the green wood hammermills (ID Nos. ES-GHM-1, ES-GHM-2, and ES-GHM-3), the dry hammermills (ID Nos. ES-HM-1 to ES-HM-8), the dry wood handling operations (ID

Emission Sources	Pollutant
Driver system/graenwood	VOC
hammermille	PM/PM10/PM2.5
controlled via a RTO	NOx
	CO
Pellet coolers pellet presses	VOC
controlled via a RCO	PM/PM10/PM2.5
One dry hommormill	VOC
	PM/PM10/PM2.5
Dry wood handling onemtions	VOC
Dry wood handning operations	PM/PM10/PM2.5

Initial testing shall be completed within 180 days of commencement of operation.

The Permittee shall conduct periodic performance tests when the following conditions are met:

- (A) As the softwood content increases by more than 10 percentage points over what was established during the initial test up to 85%, or
- (B) As the production rate increases by more than 10 percentage points over what was established during the initial test up to 625,011 ODT/year.
- (C) At a minimum testing shall be conducted annually. Annual performance tests shall be completed no later than 13 months after the previous performance test.

The Permittee shall install, calibrate, operate, maintain, and inspect a continuous temperature monitoring, and recording system, in accordance with manufacturer's recommendations, for the regenerative thermal oxidizer and regenerative catalytic oxidizer (ID Nos. CD-RTO-1 and CD-RCO) to monitor the temperature in the combustion chamber (the second half of the oxidizer away from the flame zone) to ensure the average combustion temperature does not drop below the temperature range established during the performance test.

The Permittee shall develop and maintain a written malfunction plan for the temperature monitoring and recording system that describes, in detail, the operating procedures for periods of malfunction and a protocol to address malfunctions so that corrective actions can immediately be investigated. The malfunction plan shall identify malfunctions, as described by the manufacturer, and ensure the operators are prepared to correct such malfunctions as soon as practical. The Permittee shall keep any necessary parts for routine repairs of the temperature monitoring and recording system readily available.

The Permittee shall perform periodic inspection and maintenance for the oxidizers as recommended by the manufacturer. At a minimum, the Permittee shall perform an annual internal inspection of the primary heat exchanger and associated inlet/outlet valves of the control device to ensure structural integrity.

The process rate and hardwood/softwood mix shall be recorded in a monthly log kept on site.

The results of the calculations and the total amount of VOC, NOx, and CO emissions shall be recorded monthly in a logbook (written or electronic format) and made available to an authorized representative upon request. Semi-annual reporting of monitoring activities is required.

For the dryer system, GHG (CO<sub>2</sub>e) emissions shall be calculated on a monthly basis and compliance demonstrated using the applicable Part 98 emission factors. Compliance shall be documented on a 12-month rolling basis.

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

15A NCAC 02D .0540 requires a fugitive dust control plan be prepared if ambient monitoring or air dispersion modeling show violation or a potential for a violation of a 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 Hamlet plant did not show a

violation or the potential for a violation of the  $PM_{10}$  or  $PM_{2.5}$  NAAQS. As such, a fugitive dust control plan is not required at this time.

G. 15A NCAC 02D .1100 Control of Toxic Air Pollutant (TAP) Emissions

15A NCAC 02D .1100 outlines the procedures that must be followed if a TAP permit and associated modeling are required under 15A NCAC 02Q .0700. Under 15A NCAC 02Q .0704(d), a TAP permit application is required to include an evaluation of the TAP emissions from a facility's sources, excluding exempt sources listed in Rule .0702 of this Section.

A TAP modeling analysis was performed as part of the permitting effort in January 2015 and the results demonstrated that the facility would not exceed any TAP ambient air standards. Individual TAP increases are below the previously modeled rates. As part of this permit modification Enviva is proposing to reduce total TAP emissions from 31.6 tpy to 20.5 tpy. Therefore, additional TAP modeling is not required.

#### H. 15A NCAC 02Q .0500 "Title V Permitting"

This facility is being processed under the state construction and operating permit program initially. Within one year after commencement of facility operation, the Permittee will be required to submit a complete Title V application.

#### **VI.** Other Regulatory Considerations

- An application fee of \$947.00 was received by the DAQ on May 14, 2018.
- The appropriate number of application copies was received by the DAQ.
- A Professional Engineer's Seal is required for this application and was provided (ref. Russell Kemp, P.E. Seal # 19628, 4-4-18).
- Receipt of the request for a zoning consistency determination was acknowledged by Tracy R. Parris, Planning Director, Richmond County on May 15, 2018. The proposed operation is consistent with applicable zoning ordinances.
- Public notice is not required for this modification to the State Permit issued under 15A NCAC 02Q .0300. Due to public interest in this project, the DAQ Director did require a public hearing. The hearing was held on November 8, 2018.
- IBEAM Emission Source Module (ESM) update was verified on August 31, 2018.
- According to the application, the facility does not store any materials in excess of the 112r applicability threshold.
- The application was signed by Mr. Steve Reeves, EVP and CFO Accounting, on May 3, 2018.

#### **VII.Recommendations**

This application has been reviewed by the DAQ to determine compliance with all procedures and requirements. The DAQ has determined that this facility appears to be or is expected to achieve compliance as specified in the permit with all applicable requirements. A draft permit was provided to the Fayetteville Regional Office (FRO) on August 22, 2018. The FRO responded with "no comments" to the draft on August 30, 2018. A draft permit was provided to the applicant on August 22, 2018. The sponded with minor comments on August 27, 2018. A draft permit was provided to a January 8, 2019 memo from Michael Abraczinskas, Director, the DAQ recommends issuance of Permit No. 1036R03.

ATTACHMENT 1

## Table 1Calculation InputsEnviva Pellets Hamlet, LLCHamlet, Richmond County, North Carolina

Operational Data							
Green Hammermills, Dryers, Pellet Coolers							
Short-Term Throughput (ODT/hr) 80							
Annual Throughput (ODT/yr)	625,011						
Hours of Operation (hr/yr) 8,7							
Softwood Composition 85%							
Dry Hammermills							
Short-Term Throughput (ODT/hr)	68						
Annual Throughput (ODT/yr) <sup>1</sup> 531,24							
Hours of Operation (hr/yr) 8,760							
Softwood Composition	85%						

85% raw material process by hammermil

85% of raw material is processed by the dry hammermills.

Moisture Content of Finished Pellets:	5.5%
Metric Tonnes:	600,000

1 ton =

0.91 metric tonnes

Boundary of Facility wide M2 Enclands           Boundary Courty, North Caroling           Boundary Courty, North Caroling           Politicity         Control         Contro         Control <th< th=""><th></th><th></th><th></th><th>Table 3</th><th></th><th></th><th></th><th></th><th></th><th></th></th<>				Table 3						
Polivitari         Derive Paties Karvel, Life         Derive Paties Karvel, Kett calori         Table Paties Karvel, Kett calori           Polivitari         Co-RTO:         Status Paties Karvel, Kett calori         Status Paties Karvel, Kett calori         Status Paties Karvel, Kett calori           Acatabahyde         1.8         Co-RTO:         Co-RTO:         Status Paties Karvel, Kett calori           Acatabahyde         1.8         Co-RTO:         Co-RTO:         Status Paties Karvel, Kett calori         Status Paties Karvel, Kett calori         Status Paties Karvel, Kett calori           Acatabahyde         1.8         Co-RTO:         Co-RTO:         Co-RTO:         Status Paties Karvel, Kett calori         Status Paties Karve			Summary of F	acility-wide	HAP Emissi	ons				
Pointant         Corr         Solution         Corr         Solution         Corr         Solution         Solutio			Enviva	Pellets Han	nlet, LLC					
Polistent         CD-RTO-1         Bindph (by)         Co-RC02         Es-DVH         RES-PUP			Hamlet, Richn	nond County	, North Carol	ina				r
Actalenyce1.82.40.109.02.641.82.601.84.60 </th <th>Pollutant</th> <th>CD-RTO-1<sup>1</sup> (ቱንሃ)</th> <th>ES-HM-1 through 8 (tpy)</th> <th>CD-RCO<sup>2</sup> (фу)</th> <th>ES-DWH</th> <th>IES-GN (中y)</th> <th>IES-FWP (tpy)</th> <th>IES- BARKHOG (仰y)</th> <th>IES-CHIP- 1 (фу)</th> <th>Total HAP (中y)</th>	Pollutant	CD-RTO-1 <sup>1</sup> (ቱንሃ)	ES-HM-1 through 8 (tpy)	CD-RCO <sup>2</sup> (фу)	ES-DWH	IES-GN (中y)	IES-FWP (tpy)	IES- BARKHOG (仰y)	IES-CHIP- 1 (фу)	Total HAP (中y)
Acte between and energy and	Acetaldehyde	1.8	2.4	0.13		9.0E-04	1.8E-04			4.3
Acrosim and compounds1.102.90.9-1.116-940.20<	Acetophenone	1.8E-07								1.8E-07
Antime and compounds6.56.56.77.76.77.7 <th7.7< th="">7.77.77.7&lt;</th7.7<>	Acrolein	1.0	2.9	0.79		1.1E-04	2.1E-05			4.7
Arenic act compounds1.8E-03NN <td>Antimony and compounds</td> <td>6.3E-04</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>6.3E-04</td>	Antimony and compounds	6.3E-04								6.3E-04
Banzan0.732.98-041.18-032.18-040.73Banzal() yrrano1.66-051.66-051.86-05Banzal() yrrano5.85-04Banzal() yrrano5.85-04Cadmine Netal() del ()5.85-04Cadmine Netal() del ()5.85-04Cadmine Netal() del ()5.85-04Chorions netal() del ()5.85-04Chorions netal() del ()1.85-035.85-04Chorions netal() del ()5.85-04Chorions netal() del ()5.85-04 <td< td=""><td>Arsenic and compounds</td><td>1.8E-03</td><td></td><td>2.7E-05</td><td></td><td></td><td></td><td></td><td></td><td>1.8E-03</td></td<>	Arsenic and compounds	1.8E-03		2.7E-05						1.8E-03
Barxol (pyyrneh Barxol (pyyrneh Barxol (pyyrneh Barxol (pyyrneh)I.4.E-04 B.9.E-05I.6.E-07 I.6.E-06I.WNN<	Benzene	0.23		2.9E-04		1.1E-03	2.1E-04			0.23
Bayllam metalB.9.5e.55I.5E06Chorin tar-ncholorid0.870.70 <t< td=""><td>Benzo(a)pyrene</td><td>1.4E-04</td><td>-</td><td>1.6E-07</td><td></td><td>2.2E-07</td><td>4.3E-08</td><td></td><td></td><td>1.4E-04</td></t<>	Benzo(a)pyrene	1.4E-04	-	1.6E-07		2.2E-07	4.3E-08			1.4E-04
Butadener, 1,34,86.009.00-809.005.30-04Carbon turbachorde2,55-032,50-03Carbon turbachorde2,55-032,50-03Chorben1,86-030.07Chorbenzene1,86-031,86-03Chorbenzene1,86-031,86-03Chorbenzene1,46-03	Beryllium metal	8.9E-05		1.6E-06		~				9.1E-05
Cadmiunterial4.8E-041.3E-046.3E-045.3E-03Chiorhe accondrate0.870.70.75 <td< td=""><td>Butadiene, 1,3-</td><td></td><td></td><td></td><td></td><td>4.6E-05</td><td>9.0E-06</td><td></td><td></td><td>5.5E-05</td></td<>	Butadiene, 1,3-					4.6E-05	9.0E-06			5.5E-05
Carbon tetrschiloride2,5e,032,5e,03Choroberane1.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-031.8E-033.8E-04Coharopounds1.5E-033.8E-03Dichoroparona, 1.2-1.1E-033.8E-03Dichoroparona, 1.2-1.1E-033.8E-03Dichoroparona, 1.2-1.1E-03 <td>Cadmium Metal</td> <td>4.8E-04</td> <td>-</td> <td>1.5E-04</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>6.3E-04</td>	Cadmium Metal	4.8E-04	-	1.5E-04						6.3E-04
Choine0.870.70.87Choroberane1.85-031.85-031.85-031.85-031.85-031.85-031.85-031.85-031.85-031.85-031.85-031.85-031.85-031.85-041.85-041.85-05	Carbon tetrachloride	2.5E-03								2.5E-03
Cherobergene1.8E-031.8E-03Chronhum-Other compounds1.4E-031.9E-041.5E-03Chronhum-Other compounds1.4E-031.2E-051.4E-03Cobat compounds5.3E-041.2E-053.3E-04Cobat compounds5.3E-041.2E-053.3E-04Dichtorophanen1.8E-033.3E-04Dichtorophanen, 1.2-1.8E-033.3E-04Dichtorophanen, 1.2-1.8E-033.3E-04Dichtorophanen, 1.2-0.9E-063.8E-01Dichtorophanen, 1.2-1.8E-033.8E-01Dichtorophanen1.7E-033.8E-01Dichtorophanen1.7E-033.8E-01Dichtorophanen1.7E-033.8E-01Dichtorophanen3.8E-033.8E-01Dichtorophanen3.8E-03	Chlorine	0.87								0.87
Chordorm1.5E-031.5E-03 <td>Chlorobenzene</td> <td>1.8E-03</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1.8E-03</td>	Chlorobenzene	1.8E-03								1.8E-03
Chronium-Other compounds4.7E-041.9E-041.4E-05Cobalt compounds5.3E-041.2E-053.3E-04Dichoroberane1.6E-041.6E-041.6E-043.3E-04Dichoroberane, 1.2-1.8E-033.3E-04Dichoroprane, 1.2-1.8E-033.8E-04Dichoroprane, 1.2-9.8E-063.8E-04Dichoroprane, 1.2-9.8E-061.7E-033.8EDichoroprane, 1.2-1.7E-033.8EDichoroprane, 1.2-0.942.10.500.261.7E-032.7E-044.0E-03Cobat documends3.9E-034.0E-033.8EHydrochorad0.315.2E-054.0E-033.12Lead and lack compounds0.135.2E-054.0E-033.12Metroy honice2.2E-043.5E-043.5E-04Metroy honice3.2E-043.5E-04 <t< td=""><td>Chloroform</td><td>1.5E-03</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1.5E-03</td></t<>	Chloroform	1.5E-03								1.5E-03
Chronium-Other compounds1.44e-035.44e-03Cobalt compounds5.56-041.56-041.56-045.46e-04Dichlorothanzene1.56-031.56-031.561.56-031.56-031.56-031.56-031.561.56-03 <td< td=""><td>Chromium VI</td><td>4.7E-04</td><td></td><td>1.9E-04</td><td></td><td></td><td>**</td><td></td><td>**</td><td>6.6E-04</td></td<>	Chromium VI	4.7E-04		1.9E-04			**		**	6.6E-04
Cobalt compounds5.3E-041.2E-055.4E-04Dichboroentane, 1,2-1.6E-031.6E-031.6E-03Dichboroentane, 1,2-1.8E-031.6E-03Dichboroentane, 1,2-9.9E-061.6E-03Dichboroentane, 1,2-1.6E-031.6E-03Dichboroentane, 1,2-2.6E-062.6E-06Dichboroentane, 1,2-1.7E-032.6E-06Dichboroentane, 1.2-0.942.10.523.8E-03Dichboroentane0.942.10.523.8E-03Hydrochbra add0.135.2E-053.8E-03Maganese and compounds0.135.2E-053.8E-03Mathborne5.2E-053.8E-03Methynomide8.2E-043.8E-03Methynomide1.6E-023.8E-03Methynomide1.6E-03 <td>Chromium-Other compounds</td> <td>1.4E-03</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1.4E-03</td>	Chromium-Other compounds	1.4E-03								1.4E-03
Dehhordenzene1.6E-031.6E-031.6E-03Dichorespane, 1,2-1.8E-031.6E-03Dichorespane, 1,2-1.8E-03Dichorespane, 1,2-1.8E-03Dichorespane, 1,2-0.942.7E-04	Cobait compounds	5.3E-04		1.2E-05		-				5.4E-04
Dichloropring         1,2-         1,6E-03 <td>Dichlorobenzene</td> <td>1.6E-04</td> <td></td> <td>1.6E-04</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3.3E-04</td>	Dichlorobenzene	1.6E-04		1.6E-04						3.3E-04
Dichlorpopane], 1,2-         1.8E-03 <td>Dichloroethane, 1,2-</td> <td>1.6E-03</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1.6E-03</td>	Dichloroethane, 1,2-	1.6E-03								1.6E-03
Dinktrophenol, 2,4-         9,9E-06                9,9E-06           Ethyl borzene         1.7E-03                  2.5E-06           Ethyl borzene         1.7E-03                  3.8E           Formaldehyde         0.25          0.25	Dichloropropane, 1,2-	1.8E-03	-							1.8E-03
DIQ2-etylinexylphthaite2.6E-061.7E-03Formaldehyde0.942.10.500.261.4E-032.7E-043.8Hexane0.250.253.6Hexane0.254.0E-03Manganese and compounds3.9E-036.9E-054.0E-03Manganese and compounds0.135.2E-053.1E-044.0E-03Manganese and compounds3.1E-043.6E-053.1E-043.2E-04Metry doride3.1E-043.6E-053.2E-043.2E-04Metry doride1.3E-033.2E-04Metry doride1.3E-033.2E-04Metry doride1.3E-033.2E-04Nickel metal2.9E-033.2E-03Nickel metal2.9E-033.2E-03Nickel metal2.9E-033.2E-03Nicepheny metal <td>Dinitrophenol, 2,4-</td> <td>9.9E-06</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>**</td> <td>9.9E-06</td>	Dinitrophenol, 2,4-	9.9E-06							**	9.9E-06
Ethyl barene1.7E-031.7E-03Formaldehyde0.942.10.500.261.4E-032.7E-043.8Hexane0.250.250.49Hadrachioric acid3.0E-036.9E-054.0E-05Lead and lad compounds0.135.2E-054.0E-05Manganese and compounds0.135.2E-054.0E-05Mercury vapor3.1E-043.6E-033.5E-04Mercury vapor3.1E-043.5E-04Methyl choride1.3E-031.3E-03Methyl choride1.3E-033.2E-04Methyl choride1.5E-033.2E-03Methyl choride5.4E-038.4E-053.2E-03Nickel metal2.0E-053.2E-03Nickel metal2.0E-053.2E-03Nickel metal2.0E-053.2E-03Nickel metal2.0E-053	Di(2-ethylhexyl)phthalate	2.6E-06								2.6E-06
FormaleAnyde         0.94         2.1         0.50         0.25         1.4E-03         2.7E-04           3.8           Hxxane         0.25          0.25                0.49           Hydrochlork acld         2.1                  4.0E-03           Braganese and compounds         0.13          5.2E-05              4.0E-03           Metnand and compounds         3.1E-04          3.6E-05               3.5E-04           Metnand         2.1         1.4         3.8         0.61              8.2E-04         8.2E-04           Methylonide         3.2E-04               3.8E-04           Methylonide         1.3E-03              3.2E-03           Niceiner	Ethyl benzene	1.7E-03								1.7E-03
Hexane         0.25   2.1           Lead and lead compounds         0.13          5.2E-05              0.127           Meruny wapor         3.1E-04          3.6E-05               3.5E-04         0.61                  3.5E-04         0.61         1.6E-02         0.31         8.2E-04                  5.6E-03	Formaldehyde	0.94	2.1	0.50	0.26	1.4E-03	2.7E-04			3.8
Hydrochoria add         2.1                 2.1           Lad and lead compounds         0.33         0.13          5.2E-05             0-0         0.10         0.127           Metrany, vapor         3.1E-04          3.6E-05             0-0         0.127           Methanol         2.1         1.44         3.8E-05             0-0          0.10          3.E204           Methyloromide         8.2E-04               8.2E04         1.6E-02           Methyloromide         1.5E-03                1.6E-02          1.0E-04         1.9E-05         1.6E-02	Hexane	0.25		0.25						0.49
Lead and lead compounds         3.9.E-03          6.9E-05                0.17           Manganese and compounds         0.13          5.2E-05              0.17         0.17           Metnanol         2.1         1.4         3.8         0.61            5.7E-02         0.31         8.2E-04           Methyl bonide         8.2E-04                8.2E-04           Methyl bonide         1.3E-03          8.4E-05                 3.2E-03           Methylene chloride         1.6E-02                3.2E-03           Nickel metal         2.9E-03          8.4E-05	Hydrochloric acid	2.1								2.1
Manganese and compounds         0.13          5.2E-05              0.12           Mercury, vapor         3.1E-04          3.8E-04              3.5E-04           Methanol         2.1         1.4         3.8         0.61            5.7E-02         0.31         8.2E-04           Methylomonide         8.2E-04                8.2E-04         1.8E-03           Methylomonide         1.3E-03                1.8E-03         1.8E-03           Nethylenchlorde         1.3E-03          8.4E-05                3.2E-03           Nickel metal         2.9E-03	Lead and lead compounds	3.9E-03		6.9E-05	-					4.0E-03
Mercury, yapor         3.1E-04          3.6E-05             Step of           Methanol         2.1         1.4         3.8         0.61           5.7E-02         0.31         8.2           Methyl bonide         6.2.E-04              8.2E-04           Methyl choride         1.3E-03                 1.5E-05          1.5E-05          1.5E-05          1.5E-05          1.5E-05          1.5E-05          1.5E-05          1.5E-05          1.5E-05               1.5E-05          3.2E-03 <td>Manganese and compounds</td> <td>0.13</td> <td></td> <td>5.2E-05</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.127</td>	Manganese and compounds	0.13		5.2E-05						0.127
Methanol         2.1         1.4         3.8         0.61           5.7E-02         0.31         8.2           Methyl bromide         8.2E-04 <td>Mercury, vapor</td> <td>3.1E-04</td> <td></td> <td>3.6E-05</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3.5E-04</td>	Mercury, vapor	3.1E-04		3.6E-05						3.5E-04
Methyl bromide         9.2E-04	Methanol	2.1	1,4	3.8	0.61			5.7E-02	0.31	8.2
Methylchoide         1.3E-03                               1.0E-04         1.0E-05          1.0E-05          1.0E-04         1.0E-05          1.0E-05          1.0E-04         1.0E-05	Methyl bromide	8.2E-04								8.2E-04
Methylene chloride         1.6E-02                 1.6E-02          1.6E-02           Naphthalene         5.4E-03          8.4E-05          1.0E-04         1.9E-05           5.6E-03           Nikcal metal         2.9E-03          2.4             6.0E-06           Pentachlorophenol, 4-         6.0E-06              6.0E-06           Pentachlorophenol         5.6E-05               0.042           Phenol         1.3         1.1         0.39             2.8           Phosphorus metal, yellow or white         2.1E-03             2.8         2.1E-03           Projonaldehyde         0.45         5.0         0.17               5.6           Styrene         0.10          3.3E-06	Methyl chloride	1.3E-03								1.3E-03
Naphthalene         5.4E-03          8.4E-05          1.0E-04         1.9E-05           5.6E-03           Nickel metal         2.9E-03          2.9E-04   <	Methylene chloride	1.6E-02								1.6E-02
Nickel metal         2.9E-03          2.9E-04                  6.0E-05           Pentachlorophenol         5.6E-05                 0.042           Pentachlorophenol         4.2E-02               0.042           Phosphorus metal, yellow or white         2.1E-03              2.8           Phosphorus metal, yellow or white         2.1E-03               2.8           Phosphorus metal, yellow or white         2.1E-03  -	Naphthalene	5.4E-03		8.4E-05		1.0E-04	1.9E-05			5.6E-03
Nitrophenol, 4-         6.0E-06	Nickel metal	2.9E-03		2.9E-04						3.2E-03
Pentachlorophenol         5.6E-05                                    0.042           Phenol         1.3         1.1         0.39              2.3          2.8           Phosphorus metal, yellow or white         2.1E-03              4.5         5.6            4.5         5.6            4.5         5.6            4.5          4.5          4.5          4.5          4.5          4.5          4.5            4.5          4.5          4.7	Nitrophenol, 4-	6.0E-06								6.0E-06
Perchloroethylene         4.2E-02   2.1E-03 <td>Pentachlorophenol</td> <td>5.6E-05</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5.6E-05</td>	Pentachlorophenol	5.6E-05								5.6E-05
Phenol         1.3         1.1         0.39             2.8           Phosphorus metal, yellow or white         2.1E-03               2.1E-03          2.1E-03           Polychlorinated biphenyls         4.5E-07               4.5E-07           Propionaldehyde         0.45         5.0         0.17             4.5E-07           Steinu compounds         2.3E-04         0.10              5.6           Styrene         0.10          3.3E-04             4.7E-04           Total PAH (POM)         0.14          4.7E-04          4.8E-04         9.4E-05          1.4         3.2E-03           Total PAH (POM)         0.14          9.6E-05          2.0E-04         3.9E-05          3.4E-02           Trichlorothylene         1.6E-03	Perchloroethylene	4.2E-02								0.042
Phosphorus metal, yellow or white         2.1E-03                                    4.5E-07           Proplonaldehyde         0.45         5.0         0.17             4.5E-07           Selenium compounds         2.3E-04          3.3E-06             2.3E-04           Styrene         0.10          3.3E-06             4.7E-01           Tetachlorodibenzo-p-dioxin, 2,3,7,8-         4.7E-10           4.7E-01             4.7E-01         3.2E-03           Total PAH (POM)         0.14          9.6E-05          2.0E-04         3.9E-05          0.14         3.4E-02           Trichloroethalen, 1,1,1-         3.4E-02	Phenol	1.3	1.1	0.39						2.8
Polychlorinated biphenyls         4.5E-07               4.5E-07           Propionaldehyde         0.45         5.0         0.17             5.6           Selenium compounds         2.3E-04          3.3E-06             2.3E-04         2.3E-04           Styrene         0.10          3.3E-06             2.3E-04         2.3E-04           Styrene         0.10              2.3E-04         2.3E-04           Tetrachorodibenzo-p-dioxin, 2,3,7,8-         4.7E-10             4.7E-10           Toluene         2.1E-03          4.7E-04          4.8E-04         9.4E-05          0.14           Trichloroethane, 1,1,1-         3.4E-02          2.0E-04         3.9E-05          0.14         3.4E-02           Trichlorophenol, 2,4,6-         1.6E-03         1.6E-03            1.6E-03         <	Phosphorus metal, yellow or white	2.1E-03		-						2.1E-03
Propionaldehyde         0.45         5.0         0.17              5.6           Selenium compounds         2.3E-04          3.3E-06             2.3E-04         2.3E-04           Styrene         0.10               0.10         0.10         0.10          0.10          0.10         0.10         0.10             0.10         0.10         0.10          0.10          0.10         0.10          0.10          0.10         0.10         0.10         0.10          0.10	Polychlorinated biphenyls	4.5E-07								4.5E-07
Selenium compounds         2.3E-04          3.3E-06             2.3E-04           Styrene         0.10               0.10           Tetrachlorodibenzo-p-dioxin, 2,3,7,8-         4.7E-10                 4.7E-10           Toluene         2.1E-03          4.7E-04          4.8E-04         9.4E-05          4.7E-01           Total PAH (POM)         0.14          9.6E-05          2.0E-04         3.9E-05          0.14           Trichloroethane, 1,1.1-         3.4E-02               0.14           Trichlorophenol, 2,4,6-         1.6E-03                 3.4E-02           Viny choride         9.9E-04                1.2E-05           9.9E-04         9.9E-04 <td>Propionaldehyde</td> <td>0.45</td> <td>5.0</td> <td>0.17</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5.6</td>	Propionaldehyde	0.45	5.0	0.17						5.6
Styrene         0.10              0.10           Tetrachorodibenzo-p-dioxin, 2,3,7,8-         4.7E-10             4.7E-10         3.2E-03         3.7E-03           2.0E-04         3.9E-05           3.4E-02           Trichloroethane, 1,1,1-         3.4E-02              1.2E-06          1.2E-06          1.2E-06          1.2E-06          1.2E-06          1.2E-03         3.2E-04         0.057         0.31 <t< td=""><td>Selenium compounds</td><td>2.3E-04</td><td></td><td>3.3E-06</td><td></td><td></td><td></td><td></td><td></td><td>2.3E-04</td></t<>	Selenium compounds	2.3E-04		3.3E-06						2.3E-04
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-         4.7E-10             4.7E-10           Toluene         2.1E-03          4.7E-04          4.8E-04         9.4E-05          3.2E-03           Total PAH (POM)         0.14          9.6E-05          2.0E-04         3.9E-05          0.14           Trichloroethane, 1,1,1-         3.4E-02             3.4E-02           Trichloroethylene         1.6E-03             3.4E-02           Trichloroethylene         1.6E-03             3.4E-02           Trichloroethylene         1.6E-03              1.6E-03           Trichloroethylene         1.2E-06              1.6E-03           Viny chloride         9.9E-04              9.9E-04           Xylene         1.4E-03          3.3E-04         6.5E-05	Styrene	0.10								0.10
Toluene         2.1E-03          4.7E-04          4.8E-04         9.4E-05          3.2E-03           Total PAH (POM)         0.14          9.6E-05          2.0E-04         3.9E-05          0.14           Trichloroethane, 1,1,1-         3.4E-02              3.4E-02           Trichloroethylene         1.6E-03               1.6E-03         3.4E-02           Trichloroethylene         1.6E-03               1.6E-03         3.4E-02           Trichloroethylene         1.6E-03              1.6E-03         3.4E-02           Trichloroethanel, 2,4,6-         1.2E-06             1.2E-06           Viny chioride         9.9E-04             9.9E-04         9.9E-04           Xylene         1.4E-03          3.3E-04         6.5E-05           1.8E-03      T	Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	4.7E-10								4.7E-10
Total PAH (POM)         0.14          9.6E-05          2.0E-04         3.9E-05           0.14           Trichloroethane, 1,1.1-         3.4E-02              3.9E-05          3.4E-02           Trichloroethylene         1.6E-03              3.4E-02           Trichloroethylene         1.6E-03               1.6E-03           Trichloroethylene(), 2,4,6-         1.2E-06                1.2E-06           Viny choride         9.9E-04              9.9E-04           Xylene         1.4E-03           3.3E-04         6.5E-05           1.8E-03           Total HAP Emissions <sup>3</sup> (tpy)         11         15         6.0         0.87         4.5E-03         8.9E-04         0.037         0.31         34           Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Formaldehy	Toluene	2.1E-03		4.7E-04		4.8E-04	9.4E-05			3.2E-03
Trichloroethane, 1,1,1-         3,4E-02                3,4E-02           Trichloroethylene         1.6E-03                3,4E-02           Trichloroethylene         1.6E-03               1.6E-03           Trichlorophenol, 2,4,6-         1.2E-06               1.6E-03           Viny choride         9.9E-04               9.9E-04           Xylene         1.4E-03            3.3E-04         6.5E-05           1.8E-03           Total HAP Emissions <sup>3</sup> (tpy)         11         15         6.0         0.87         4.5E-03         8.9E-04         0.057         0.31         34           Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Methanol         Methanol         Methanol         Methanol	Total PAH (POM)	0.14		9.6E-05		2.0E-04	3.9E-05			0.14
Trichloroethylene         1.6E-03              1.6E-03         1.6E-03           Trichlorophenol, 2,4,6-         1.2E-06              1.6E-03           Viny chloride         9.9E-04               1.2E-06           Viny chloride         9.9E-04              9.9E-04           Xylene         1.4E-03              9.9E-04           Xylene         1.4E-03            3.3E-04         6.5E-05           1.8E-03           Total HAP Emissions <sup>3</sup> (tpy)         11         15         6.0         0.87         4.5E-03         8.9E-04         0.057         0.31         34           Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Formaldehyde         Formaldehyde         Methanol         Methanol           Maximum Individual HAP Emissions (tpy)         2.1         5.0         3.8         0.61         1.4E-03         2.7E-04         0.0	Trichloroethane, 1,1,1-	3,4E-02								3.4E-02
Trichlorophenol, 2,4,6-         1.2E-06               I.2E-06           Viny chloride         9,9E-04              I.2E-06           Xylene         1.4E-03              9,9E-04           Xylene         1.4E-03           3.3E-04         6.5E-05           1.8E-03           Total HAP Emissions <sup>3</sup> (tpy)         11         15         6.0         0.87         4.5E-03         8.9E-04         0.057         0.31         34           Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Formaldehyde         Formaldehyde         Methanol         Methanol           Maximum Individual HAP Emissions (tpy)         2.1         5.0         3.8         0.61         1.4E-03         2.7E-04         0.057         0.31         8.2	Trichloroethylene	1.6E-03				-				1.6E-03
Vinyl chloride         9.9E-04               9.9E-04           Xylene         1.4E-03           3.3E-04         6.5E-05          9.9E-04           Xylene         1.4E-03           3.3E-04         6.5E-05           1.8E-03           Total HAP Emissions <sup>3</sup> (tpy)         11         15         6.0         0.87         4.5E-03         8.9E-04         0.057         0.31         3.4           Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Methanol         Formaldehyde         Methanol         Methanol           Maximum Individual HAP Emissions (tpy)         2.1         5.0         3.8         0.61         1.4E-03         2.7E-04         0.057         0.31         8.2	Trichlorophenol, 2,4,6-	1.2E-06							1	1.2E-06
Xylene         1.4E-03           3.3E-04         6.5E-05           1.8E-03           Total HAP Emissions <sup>3</sup> (tpy)         11         15         6.0         0.87         4.5E-03         8.9E-04         0.057         0.31         34           Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Methanol         Formaldehyde         Formaldehyde         Methanol         Methanol           Maximum Individual HAP Emissions (tpy)         2.1         5.0         3.8         0.61         1.4E-03         2.7E-04         0.057         0.31         8.2	Vinyl chloride	9.9E-04								9.9E-04
Total HAP Emissions <sup>2</sup> (tpy)         11         15         6.0         0.87         4.5E-03         8.9E-04         0.057         0.31         34           Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Methanol         Formaldehyde         Formaldehyde         Methanol	Xylene	1.4E-03				3.3E-04	6.5E-05			1.8E-03
Maximum Individual HAP (tpy)         Hydrochloric acid         Propionaldehyde         Methanol         Methanol         Formaldehyde         Formaldehyde         Methanol         Methanol           Maximum Individual HAP Emissions (tpy)         2.1         5.0         3.8         0.61         1.4E-03         2.7E-04         0.057         0.31         8.2	Total HAP Emissions <sup>3</sup> (tpy)	11	15	6.0	0.87	4.5E-03	8.9E-04	0.057	0.31	34
Maximum Individual HAP Emissions (tpy) 2.1 5.0 3.8 0.61 1.4E-03 2.7E-04 0.057 0.31 8.2	Maximum Individual HAP (tpy)	Hydrochloric acid	Propionaldehyde	Methanol	Methanol	Formaldehvde	Formaldehyde	Methanol	Methanol	Methanol
	Maximum Individual HAP Emissions (tpy)	2.1	5.0	3.8	0.61	1.4E-03	2.7E-04	0.057	0.31	8.2

Includes emissions at outlet of RTO-1 stack as well as the HAP combustion emissions resulting from NG by the RTO-1 burners. RTO-1 controls emissions from the dryer (ES-DAYER) and green hammermills (ES-GHM-1 through 3).
Includes emissions at outlet of RCO stack as well as the HAP combustion emissions resulting from NG by the RCO burners. RCO controls emissions from the pellet coolers and pellet mill (ES-CLR-1 through 6). The pellet coolers will be equipped with an RCO that will operate primarily in catalytic mode with thermal (RTO) mode as a backup. The RTO and RCO modes have the same control efficiency so there will be no impact on emissions during thermal mode usage.

Because benzo(a)pyrene and naphthalene emissions were presented individually and as components of total PAH emissions, the total HAP emissions presented here do not match the sum of all pollutant emissions to avoid double counting benzo(a)pyrene and naphthalene emissions.

breviations:	
HAP - hazardous air pollutant	RTO - regenerative thermal oxidizer
RCO - regenerative catalytic oxidizer	tpy - tons per year

		Table	e 4	
	Potential En	nissions at C	utiet of R	FO-1 Stack
a mart samma a marte overster 1961 filosofisticity statemen par a t valuante a	ES-DRY	ER and ES-	GHM-1 thr	ough 3
	Env	viva Pellets	Hamlet, Ll	.c
	Hamlet, Ri	chmond Cou	inty, North	Carolina
Calculation Basis		1		1
Hourly Throughput	80	ODT/hr		
Annual Throughput	625,011	ODT/yr		1
Hourly Heat Input Capacity	250.4	MMBtu/hr		
Annual Heat Input Capacity	2,193,504	MMBtu/yr		
Hours of Operation	8,760	hr/yr		
Number of RTO Burners	4	burners		
RTO Burner Rating	8	MMBtu/hr		
RTO Control Efficiency	95%			
· · · · · · · · · · · · · · · · · · ·				1
			L	
Potential Criteria Pollutant and Greenbou	ISO Gas Emics	long		
Potential Criteria Pollutant and Greenhou Pollutant	use Gas Emiss Controlled Emission	ions Units	Emission	s at RTO-1 itlet <sup>1</sup>
Potential Criteria Pollutant and Greenhou Pollutant	use Gas Emiss Controlled Emission Factor	ions Units	Emission Ou (lb/hr)	s at RTO-1 itlet <sup>1</sup> (tpy)
Potential Criteria Pollutant and Greenhou Pollutant CO	use Gas Emiss Controlled Emission Factor 50	Units	Emission Ou (lb/hr) 50	s at RTO-1 ttlet <sup>1</sup> (tpy) 219
Potential Criteria Pollutant and Greenhou Pollutant CO NO <sub>x</sub>	use Gas Emiss Controlled Emission Factor 50 50	ions Units Ib/hr <sup>2</sup> Ib/hr <sup>2</sup>	Emission Ou (lb/hr) 50 50	s at RTO-1 ttlet <sup>1</sup> (tpy) 219 219
Potential Criteria Pollutant and Greenhou Pollutant CO NO <sub>x</sub> SO <sub>2</sub>	use Gas Emiss Controlled Emission Factor 50 50 0.025	Ib/hr <sup>2</sup> Ib/hr <sup>2</sup> Ib/MMBtu <sup>3</sup>	Emission Ou (lb/hr) 50 50 6.3	s at RTO-1 ntlet <sup>1</sup> (tpy) 219 219 219 27
Potential Criteria Pollutant and Greenhou Pollutant CO NO <sub>X</sub> SO <sub>2</sub> VOC	use Gas Emiss Controlled Emission Factor 50 50 0.025 0.12	ions Units Ib/hr <sup>2</sup> Ib/hr <sup>2</sup> Ib/MBtu <sup>3</sup> Ib/ODT <sup>4</sup>	Emission Ou (lb/hr) 50 50 6.3 10	s at RTO-1 ntlet <sup>1</sup> (tpy) 219 219 219 27 39
Potential Criteria Pollutant and Greenhou Pollutant CO NO <sub>X</sub> SO <sub>2</sub> VOC PM/PM <sub>10</sub> /PM <sub>2.5</sub> (Filterable + Condensable)	Lise Gas Emiss Controlled Emission Factor 50 50 0.025 0.12 7.6	Ib/hr <sup>2</sup> Ib/hr <sup>2</sup> Ib/MMBtu <sup>3</sup> Ib/ODT <sup>4</sup> Ib/hr <sup>2</sup>	Emission Ot (lb/hr) 50 50 6.3 10 7.6	s at RTO-1 tilet <sup>1</sup> (tpy) 219 219 27 39 33

1. Exhaust from the dryer (ES-DRYER) and green hammermills (ES-GHM-1 through 3) are routed to a WESP and then RTO for control of VOC, HAP, and particulates. <sup>2</sup> Emission rate based on data provided by RTO vendor (Lundberg) and include thermal emissions from the use of the RTO.

<sup>3</sup> No emission factor is provided in AP-42, Section 10.6.2 for SO<sub>2</sub> for rotary dryers. Enviva has conservatively calculated SO<sub>2</sub> emissions based on AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

4. VOC emission factor based on source test results from similar Enviva facilities.

<sup>5.</sup> Emission factor for CO<sub>2</sub> from AP-42, Section 10.6.1 for rotary dryer with RTO control device. Enviva has conservatively calculated the CO2 emissions using the hardwood emission factor because the dryer at Hamlet uses a combination of hardwood and softwood and the hardwood emission factor is greater than the softwood emission factor.

A A A A A A A A A A A A A A A A A A A	$\begin{array}{c} 5.76-03\\ 3.26-03\\ 3.26-03\\ 4.16-03\\ 4.16-03\\ 1.26-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.16-03\\ 1.26-04\\ 1.26-$	B/D DT           B/DT           B/D	1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.46 0.26 0.24 0.23 0.33 0.33 0.33 0.4.00-08 1.4E-04 4.0E-04 0.20 <b>3.3E-05</b> <b>7.4E-05</b> <b>5.3E-02</b> <b>0.20</b> <b>4.4E-04</b> <b>3.3E-05</b> <b>3.2E-04</b> <b>0.4E-05</b> <b>3.2E-04</b> <b>1.2E-04</b> <b>2.4E-05</b> <b>3.2E-04</b> <b>1.2E-04</b> <b>2.4E-05</b> <b>3.2E-04</b> <b>1.2E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>2.3E-04</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-04</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.3E-05</b> <b>3.</b>	1. (1) 1. (1)
A A A A A A A A A A A A A A A A A A A	$\begin{array}{c} 5.76.03\\ 3.26.03\\ 3.26.03\\ 3.26.03\\ 3.26.03\\ 3.26.03\\ 3.26.03\\ 3.26.04\\ 3.26.06\\ 3.26.06\\ 3.26.06\\ 3.26.06\\ 3.26.06\\ 3.26.06\\ 3.36.05\\ 3.36.$	B/D DT B/ODT B/ODT B/ODT B/ODT B/ODT B/MBE B/ODT B/MBE B/ODT B/MBE B/MB/	1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.46 0.26 0.24 0.53 0.12 4.0E-04 4.0E-04 4.0E-04 5.3E-04 0.22 2.0E-05 5.5E-04 0.22 4.1E-04 3.3E-05 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 0.4E-05 0.4E-0	1 1 1 1 1 1 1 1 1 1 2 3 2 2 3 2 2 2 3 2 3 2 3 3 2 3
А. А. А. А. А. А. А. А. А. А.	$\begin{array}{c} 5.7E.03\\ 3.2E.03\\ 3.3E.03\\ 3.3E.$	By/ODT By	1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.46 0.26 0.24 0.24 0.53 0.33 0.12 4.00-08 1.45.04 4.00-08 3.37-05 0.20 1.45.04 0.20 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 1.264.05 0.22 1.264.05 0.22 1.264.05 0.22 1.264.05 0.22 1.264.05 0.22 1.264.05 0.22 1.264.05 0.22 1.264.05 0.22 1.264.05 0.22 0.22 1.264.05 0.22 0.22 0.22 0.22 0.22 0.22 0.22 0	1.1. 1.1. 1.2. 1.3. 1.42 1.72 0.2. 1.52 2.52 2.65 1.52 2.65 1.52 2.65 1.52 2.65 1.52 2.65 1.52 2.65 1.52 2.65 1.52 2.65 1.52 2.65 1.52 2.65 1.52 2.55
Y Y Y Y Y Y Y Y Y Y Y Y Y Y	$\begin{array}{c} 3.4 \\ 5.4 \\ 0.4 \\$	ID / AD DIT ID /		0.24 0.24 0.24 0.24 0.24 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
↓ Y Y Y Y Y Y Y Y Y Y Y Y Y	$\begin{array}{c} 6.6E-03\\ 6.6E-03\\ 1.4E-03\\ 2.2E-09\\ 7.9E-06\\ 2.2E-05\\ 2.2E-05\\ 1.4E-03\\ 2.2E-05\\ 1.4E-05\\ 2.2E-05\\ 1.4E-05\\ 2.8E-05\\ 1.8E-05\\ 1.8E-$	b. ODT b. ODT b. ODT b. ODT b. ODT b. ODT b. MMBL b. MMBL	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.23 0.33 0.32 4.0E-08 4.0E-04 5.3E-02 7.4E-05 5.8E-04 0.20 7.4E-05 5.8E-04 0.20 0.20 4.1E-04 3.5E-04 6.4E-05 3.2E-04 4.1E-04 2.3E-06 5.9E-07 3.2E-04 4.2E-10 0.4E 8.7E-04 2.3E-06 6.4E-05 5.9E-07 3.2E-04 0.4E 0.4E 0.4E 0.4E 0.4E 0.4E 0.4E 0.	0.3 3.3 1.7 5.2 1.7 5.2 1.4 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2
A A A A A A A A A A A A A A A A A A A	$\begin{array}{c} 4.16-01\\ 1.46-03\\ 1.26-09\\ 7.96-06\\ 2.26-09\\ 2.26-$	Brooth Street St		0.33 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12	1. 0.4 1.8E 6.3E 1.7F 0.3 1.4E 8.7E 9.8E 8.7E 9.8E 8.7E 9.3E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E 8.7E 9.3E
А. А. А. А. А. А. А. А. А. А.	$\begin{array}{c} 1.4E-03\\ 2.2E-09\\ 7.9E-06\\ 2.2E-05\\ 2.2E-05\\ 4.2E-0.3\\ 2.2E-0.5\\ 3.2E-05\\ 3.2E-05\\ 3.3E-05\\ 3.3$	B)-OOT B/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU b/MMBEU	1 1 2 4 2 2 2 2 2 2 2 2 2 2 2 2 2	0.12 4.0E-08 5.3E-02 3.3E-05 7.4E-05 5.3E-02 7.4E-05 5.5E-04 0.20 7.4E-05 5.5E-04 0.20 0.20 1.2E-04 1.	0.44 1.82E4 6.32E1.77E1 0.11.77E1 3.32E2.52E 2.52E1.42E 2.62E1.42E 2.62E1.42E 2.62E1.42E 2.62E1.42E 2.62E1.42E 2.62E1.42E 2.62E1.42E 2.62E1.42E1.42E1.42E1.42E1.42E1.42E1.42E1.4
А.К. А.К. A. N. M. A. A. A. M. W. A. A. A. A. A. A. A. A. M. A. A. M. A. A. M. M. A. A. M. M. M. A. M. M. M. A. M. M. M. A. M.	$\begin{array}{c} 1.2 \\ \hline 2.2 \\ -$	Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL Ib/MMBEL	1 2 4 2 4 2 3 2 4 2 3 2 4 2 3 2 4 2 3 2 4 2 3 2 4 2 3 2 4 2 3 2 4 2 3 2 4 2 3 2 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 3 2 4 4 2 2 3 2 4 4 2 2 3 2 4 4 2 2 3 2 4 4 2 2 3 2 4 4 2 2 3 2 2 4 5 2 4 4 2 2 3 2 2 4 3 2 2 4 3 2 2 4 3 2 2 3 2 2 4 5 2 2 4 3 2 2 3 2 2 4 5 2 4 4 2 2 3 2 2 4 5 2 4 4 2 2 3 2 2 4 2 2 3 2 2 4 2 2 3 2 2 4 5 2 4 4 2 2 3 2 4 2 3 2 2 4 5 2 4 4 2 3 2 4 5 2 4 4 2 3 2 4 5 2 4 4 2 4 5 2 4 4 2 4 5 2 4 4 2 4 5 2 4 4 2 4 5 2 4 4 2 3 2 4 2 4 2 4 2 4 2 4 2 4 2 3 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 3 2 4 2 4 2 4 2 3 2 3 2 4 2 3 2 3 2 3 2 4 2 3 2 3 2 3 2 4 4 2 3 2 3 2 3 2 4 2 3 3 2 4 3 3 3 3 3 3 3 3 3 3 3 3 3	4.0E-08 4.0E-08 4.0E-04 5.3E-02 3.3E-05 5.8E-04 0.20 4.1E-04 3.5E-04 3.5E-04 3.5E-04 3.5E-04 3.5E-04 3.5E-04 2.2E-04 3.5E-04 2.2E-04 3.5E-04 2.2E-04 3.5E-04 2.2E-05 3.2E-04 3.5E-04 2.2E-05 3.2E-04 3.5E-04 2.2E-05 3.2E-04 3.5E-04 2.2E-05 3.2E-04 3.5E-04 2.2E-05 3.2E-04 3.5E-0	1.8E 6.3E 1.7E 0.2 1.4E 7.7E 0.2 1.4E 7.7E 0.2 1.8E 1.5E 2.8E 1.4E 5.2F 1.4
м М M M M M M M M M M M M M M M M M M M	$\begin{array}{c} 7.9E-06\\ 7.9E-06\\ 2.2E-03\\ 4.2E+0.3\\ 2.2E-03\\ 4.2E+0.3\\ 3.6E-06\\ 1.1E-06\\ 4.1E-06\\ 4.1E-06\\ 3.3E-06\\ 1.8E-05\\ 6.5E+06\\ 1.8E-05\\ 1.8$	Ib/MMBLu ib/MBLu ib/MBLU ib/MBLU ib/MBLU ib/MBLu ib/MBLU i	124 24 23 23 24 23 24 23 24 24 24 24 24 24 24 23 24 24 23 24 24 24 24 24 24 24 24 24 24 24 24 24	1 4F-04 4.0E-04 4.0E-04 2.0F-05 7.4E-05 5.8E-04 0.20 4.1F-04 3.5E-04 4.1F-04 3.5E-04 4.1E-04 3.6E-04 4.1E-04 4.1E-04 3.6E-04 4.1E-04 4.1E-04 3.6E-04 4.1E-04 4.1E-04 3.6E-04 4.1E-04 3.6E-04 4.1E-04 3.6E-05 1.9E-02 0.0AE 0.0	6.3E 1.7E 0.3 1.4E 3.7E 3.3E 2.5E 1.5E 2.8E 5.2E 1.4E 5.2E 1.4E 5.2E 1.4E 5.2E 1.4E 5.2E 1.4E 5.2E 1.4E 5.2E 1.4E 5.2E 1.4E 5.2E 1.4E 5.2E 5.2E 1.4E 5.2E 5
К. К. А. К.	$\begin{array}{c} 2 \; 2E \; 05 \\ 2 \; 42E \; 03 \\ 4 \; 4E \; 03 \\ 4 \; 4E \; 05 \\ 4 \; 11 \; 42 \; 06 \\ 4 \; 11 \; 42 \; 06 \\ 4 \; 11 \; 42 \; 06 \\ 4 \; 11 \; 42 \; 06 \\ 4 \; 11 \; 42 \; 06 \\ 4 \; 11 \; 42 \; 06 \\ 4 \; 11 \; 42 \; 06 \\ 3 \; 3E \; 06 \\ 3 \; 06 \; 06 \\ 3 \; 06 \; 06 \\ 3 \; 06 \; 06 \\ 3 \; 06 \; 06 \\ 3$	is //mmBiu, by/mBiu,	24 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	4.0E-04 5.3E-02 5.3E-02 7.4E-05 5.8E-04 0.20 4.1E-04 3.3E-04 4.1E-04 3.3E-04 4.1E-04 3.3E-04 4.1E-04 2.3E-04 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-05 0.4E-05 0.	1.7F 0.2 1.4F 0.7E 0.87E 1.4F 0.87E 1.4E 2.8E 1.5E 2.8E 2.8E 1.4E 2.8E 2.6E 1.7E 2.6E 1.7E 2.6E 1.7E 2.5 3.8E 0.1 1.8E 2.6E 1.7E 2.5E 2.5E 2.5E 2.5E 2.5E 2.5E 2.5E 2.5
Y         Y           N         Y           N         Y           N         Y           N         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y	$\begin{array}{c} 4.2E - 0.3 \\ 4.1E - 0.6 \\ 5.6E - 0.6 \\ 4.1E - 0.6 \\ 5.5E - 0.6 $	Ib/r/MBLu b/mMBLu Ib/mBLu Ib/	2.3 2.4 2.4 2.3 2.4 2.3 2.4 2.4 2.4 2.4 2.4 2.4 2.3 2.4 2.3 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4	5.3E-02 3.3E-05 2.0E-05 2.0E-05 2.0E-05 2.0E-05 0.20 0.20 0.20 0.20 0.20 0.20 0.20 0.	0.3 1.4E 3.3E 2.5E 0.6 1.5E 2.8E 1.4E 5.2E 1.6E 1.6E 1.8E 2.6E 1.8E 2.6E 1.8E 2.6E 1.8E 2.6E 1.8E 2.6E 1.8E 2.5E 1.8E 1.8E 1.8E 1.8E 1.8E 1.8E 1.8E 1.8
$\begin{array}{c} \mathbf{Y}\\ \mathbf{N}\\ \mathbf{N}\\ \mathbf{N}\\ \mathbf{N}\\ \mathbf{N}\\ \mathbf{V}\\ \mathbf{V}\\ \mathbf{V}\\ \mathbf{N}\\ \mathbf{N}\\ \mathbf{N}\\ \mathbf{V}\\ \mathbf{V}\\$	$\begin{array}{c} 2.6 \pm 0.6 \\ 2.6 \pm 0.6 \\ 1.1 \pm 0.0 \\ 4.1 \pm 0.0 \\ 3.5 \pm 0.0 \\ 3.5 \pm 0.6 \\ 3.3 \pm 0.5 \\ 3.5 \pm 0.6 \\ 5.5 \pm 0.6 \\$	b / MMBEL (b / MMBEL b / MMBEL	23 24 23 24 23 245 245 245 245 24 23 23 23 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	3.3E-05 2.4E-05 2.4E-05 5.6E-04 0.20 4.1E-04 3.5E-04 0.4E-05 1.2E-04 1.4E-04 1.2E-05 1.2E-0	1.4E 3.3E 2.5E 2.5E 2.8E 1.4E 5.2E 1.6E 1.8E 9.9E 2.6E 1.8E 9.9E 2.6E 1.8E 9.9E 2.5E 1.8E 1.7E 1.8E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.7E 1.8E 1.3E
$\begin{array}{c} \psi_{1} \\ \psi_{2} \\ \psi_{3} \\$	$\begin{array}{c} 1.1E-06\\ 1.1E-06\\ 4.1E-06\\ 4.5E-05\\ 7.9E-04\\ 3.3E-05\\ 3.3E-$	IG //M MBLU ID //M MBLU	2.4 2.3 2.3 2.4 2.4 2.4 2.4 2.4 2.4 2.3 2.3 2.4 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3	2.0E-05 7.4E-05 5.5E-04 0.20 4.1E-04 3.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 2.3E-06 5.9E-07 1.4E-04 2.3E-06 5.9E-07 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-01 0.4E-010	8.7f 3.3E 2.5E 0.6E 1.8E 1.5E 2.8E 1.4E 5.2E 1.6E 1.8E 9.9E 2.6E 1.7E 2.8E 0.1 2.8E 0.1 2.8E 1.7E 2.5E 0.0E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.8E 1.8E 1.5E 1.8E 1.5E 1.8E 1.8E 1.5E 1.8E 1.5E 1.8E 1.8E 1.5E 1.8E 1.8E 1.5E 1.8E 1.5E 1.8E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.5E 1.8E 1.7E 1.8E 1.7E
$\begin{array}{c} N\\ Y\\ \hline \end{array} \\ \hline \\ Y\\ \hline Y\\ Y$	$\begin{array}{c} 4 & 18 & 06 \\ 4 & 18 & 05 \\ 7 & 57 & 04 \\ 3 & 38 & 05 \\ 3 & 38 & 05 \\ 3 & 38 & 05 \\ 3 & 38 & 05 \\ 6 & 58 & 06 \\ 6 & 58 & 06 \\ 3 & 38 & 05 \\ 3 & 38 & 05 \\ 1 & 86 & 07 \\ 4 & 75 & 05 \\ 1 & 86 & 07 \\ 1 & 47 & 56 \\ 1 & 16 & 07 \\ 1 & 16 & $	by/measurements/ by/mea	14 23 245 245 245 24 23 23 23 23 23 23 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	7.4E-05 5.6E-04 0.20 4.1E-04 3.5E-04 6.4E-05 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 1.2E-04 2.3E-06 5.9E-07 1.9E-04 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-10 0.4E 2.2E-05 1.9E-04 2.2E-05 0.4E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5E 0.4E 0.5	3.3E 2.5E 0.6 1.5E 2.8E 1.4E 5.2F 1.6E 1.6E 2.6E 2.6E 2.6E 2.6E 2.6E 2.6E 2.8E 5.2E 1.3E
Y         N           Y         N           N         N           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           N         N           N         N           Y         Y           N         N           N         N           Y         Y           N         N           N         N           N         N           Y         Y           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N	$\begin{array}{c} 4.5E-05\\ 7.5E-04\\ 3.3E-05\\ 2.8E-05\\ 3.5E-06\\ 1.6E-05\\ 3.3E-06\\ 3.3E-05\\ 3.3E-06\\ 3.3E-05\\ 3.3E-05\\ 3.3E-05\\ 3.3E-05\\ 3.3E-05\\ 3.3E-05\\ 3.3E-05\\ 3.4E-05\\ 3.5E-05\\ 3.3E-05\\ 3.3E-$	Ib/MMBLU io/MBLU ib/MBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU ib/MMBLU	23 245 245 245 245 24 24 23 23 23 23 23 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	5.65-04 0.20 4.16-04 3.55-04 6.4E-05 1.22-04 1.22-04 1.22-04 1.22-04 1.25-06 5.95-07 1.35-06 5.95-07 1.35-04 2.22-10 0.48 8.75-04 2.92-02 6.45-05 1.25-04 2.92-02 6.45-05 1.25-04 2.92-02 6.45-05 1.25-04 2.92-02 6.45-05 1.25-04 2.92-02 6.45-05 1.25-04 2.92-02 0.45 1.25-04 2.92-02 0.45 1.25-04 2.92-02 0.45 1.25-04 0.45 1.25-04 0.45 1.25-04 0.45 1.25-04 0.45 1.25-04 0.45 1.25-04 0.45 1.25-04 0.45 1.25-04 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.	2.5E 0.8 1.5E 2.8E 1.4E 5.2E 1.6E 1.8E 9.9E 2.6E 1.7E 9.8E 2.6E 1.7E 9.8E 2.6E 1.7E 9.8E 2.6E 1.7E 9.8E 2.6E 1.7E 9.8E 2.6E 1.7E 9.8E 1.7E 9.8E 1.7E 9.8E 1.7E 1.8E 1.8E 1.8E 1.8E 1.8E 1.8E 1.8E 1.8
$\begin{array}{c} \mathbf{N} \\ \mathbf{Y} \\ \mathbf{Y} \\ \mathbf{V} \\ \mathbf{N} \\ \mathbf{N} \\ \mathbf{N} \\ \mathbf{Y} \\ $	$\begin{array}{c} 2 \ g \in \ d 4 \\ 3 \ 3 \ 5 \ c 0 \\ 4 \ 5 \ 5 \ c 0 \\ 5 \ 5 \ c 0 \\ 5 \ c 0 \ c 0 \\ 5 \ c 0 \\ 5 \ c 0 \ c 0 \\ 5 \ c 0 \ c 0 \\ 5 \ c 0 \ c 0 \\ c 0 \$	la //m Witeu la //m Witeu la //m Witeu la //m Witeu la //m Witeu la //m Witeu la //m Bitu la //m Bitu	23 24 24 24 24 23 23 23 23 26 24 24 24 24 24 24 23 23 24 24 24 24 24 23 24 24 24 24 24 24 24 24 24 24 24 24 24	0.20 4.1E-04 5.5E-04 6.4E-05 1.2E-04 1.2E-04 1.2E-04 2.3E-04 2.3E-04 2.3E-04 2.3E-04 2.3E-04 2.3E-04 2.2E-10 0.4E 2.9E-04 2.9E-04 2.9E-04 2.9E-04 2.9E-04 3.6E-05 3.6E	0.8 1.8 2.8 2.8 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2
Y         N           N         N           N         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           N         N           N         N           N         N           Y         Y           N         N           Y         Y           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N           N         N	$\begin{array}{c} 3.3E-05\\ 2.8\pi+05\\ 3.5E-06\\ 1.18E-05\\ 5.8+06\\ 3.3E-06\\ 3.3E-05\\ 3.3E-$	Ib // MIRL b/ // MIRL	23 24,5 24,5 23 23 23 23 23 23 23 23 23 24 24 24 24 24 24 23 23 23 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	4 11F-04 3.5E-04 3.5E-04 1 2E-04 1 2E-04 1 3.6E-04 4.1E-04 2.3F-06 5.9E-07 1.9F-04 2.2E-04 0 0.4E 2.9F-07 1.9F-04 2.9F-04 0.4E-05 1.9F-04 2.9F-04 0.4E-05 1.9F-04 2.9F-04 0.4E-05 1.9F-04 2.9F-04 0.4E-05 1.9F-04 2.9F-04 0.4E-05 1.9F-04 2.9F-04 0.4E-05 1.9F-04 0.4E-05 1.9F-04 0.4E-05 1.9F-04 0.4E-05 1.9F-04 0.4E-05 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-05 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-04 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.4E-05 0.3E-04 0.4E-05 0.4E-05 0.3E-04 0.4E-05 0.3E-04 0.4E-05 0.3E-04 0.4E-05 0.3E-04 0.4E-05 0.3E-04 0.4E-05 0.3E-04 0.4E-05 0.3E-04 0.4E-05 0.3E-04 0.4E-05 0.3E-05 0.5E	1 8F 1 5E 2.8E 1.4E 5 2F 1.6E 1.8E 9.9E 2.6E 1.7E 9.8E 2.8E 5 2E 1.3E
Y         N           N         N           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           N         N           N         N           N         N           N         N           Y         Y           N         N           N         N           Y         Y           N         N           Y         Y           Y         Y	$\begin{array}{c} 2 8^+ 0.5\\ 3 .5 E^- 0.6\\ 5 .5 E^- 0.6\\ 3 .5 E^- 0.6\\ 3 .5 E^- 0.6\\ 3 .5 E^- 0.6\\ 1 .8 E^- 0.7\\ 4 .5 E^- 0.5\\ 1 .8 E^- 0.7\\ 1 .5 E^- 0.5\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.6\\ 1 .5 E^- 0.5\\ 2 .5 .4 E^- 0.5\\ 2 .5 .5 .5 \\ 2 .5 .5 .5 \\ 2 .5 .5 .5 \\ 2 .5 .5 .5 \\ 2 .5 .5 \\ 2 .5 .5 \\ 2 .5 .5 \\ 2 .5 .5 \\ 2 .5 .5 \\ 2 .5 .5 \\ 2 .5 .5 \\ 2 .5 .5 \\ 2 .5 \\ $	Ib/MMBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU Ib/MBU	245 24 24 24 24 23 23 23 23 23 23 23 24 24 24 24 24 24 23 23 23 23 23 23 23 23 23 23 23 23 24 24 24 23 24 24 24 24 24 24 24 24 24 24 24 24 24	3.5E-04 6.4E-05 1.2E-04 1.2E-04 1.2E-04 4.1E-04 4.1E-04 2.3F-06 5.9E-07 1.9F-04 2.2E-10 0.4H 8.7E-04 2.2E-10 0.4H 8.7E-04 2.9F-02 2.9F-02 5.9E-04 6.4E-05 1.9F-04 2.9F-02 5.9E-04 6.4E-05 1.9F-04 2.9F-02 5.9E-04 6.4E-05 1.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 2.9F-04 0.4H 0.4H 0.4H 0.4H 0.4H 0.4H 0.4H 0.	1.5E 2.8E 1.4E 5.2F 1.6E 1.8E 2.6E 1.7E 2.6E 1.7E 2.6E 2.3.8E 0.1 2.8E 5.2E 1.3E
N         N           N         N           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           N         N           N         N           Y         Y           Y         N           Y         Y           Y         N           Y         Y           Y         Y           Y         N           Y         Y	3.5E-06 1.8E-05 2.9E-05 3.3E-05 3.3E-05 3.3E-05 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 1.8E-07 2.8E-05 2.8	Ib/MMBtu Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta Ib/MMBta	245 24 23 23 23 23 23 23 23 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	6.4E-05 3.2E-04 3.6E-04 3.6E-04 3.6E-04 3.6E-04 3.9E-07 3.9E-04 2.2E-30 0.4E 8.7E-04 2.9E-04 2.9E-04 1.9E-04 2.9E-04 3.6E-05 3.6E-0	2.8E 1.4E 5.2E 1.6E 1.8E 9.9E 2.6E 1.7E 9.8E 2.3 3.8E 0.1 2.8E 5.2E 1.3E
N         N           Y         Y           Y         Y           Y         Y           N         N           Y         Y           N         N	$\begin{array}{c} 1.8 \Xi  0.5 \\ 6.5 \Xi  -0.6 \\ 3.3 \Xi  -0.5 \\ 3.4 \Xi  -0.5 \\ $	ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU ID/MMBLU	24 23 23 23 23 23 23 23 24 24 24 24 24 23 23 23 23 23	1 2E-04 1 2E-04 3 6E-04 3 6E-04 2 3E-06 5.9E-07 3 9E-04 2 .2E-10 0 4E 8 7E-04 2 9E-02 6 4E-05 1 9E-04 2 9E-04 2 9E-04 3 6E-05 3 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5	1.4E 5 2F 1.6E 1.8E 9.9E 2.6F 1.7E 9.8E 2.3 3.8E 0.1 2.8E 5.2E 1.3E
N Y Y Y Y Y Y Y Y Y Y Y Y Y	6 52 06 2.98 05 3.36 05 1.88 07 4.75 08 3.18 07 4.75 08 3.18 07 4.75 08 3.18 07 4.75 08 3.18 07 3.18 07 3.18 07 3.18 07 3.18 07 3.55 06 3.55 06 3.5	Ib./MM BLU Ib./MM BLU	2.4 2.3 2.3 2.3 2.3 2.3 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.3 2.3 2.3 2.3	1 2E-04 3.6E-04 4.1E-04 2.3E-06 5.9E-07 3.9E-04 2.2E-10 0.4E 8.7E-04 2.9E-02 6.4E-05 1.9E-04 2.9E-04 0.8E-05 3.6E-05 3.6E-05 3.6E-05 3.6E-04 2.9E-04 0.8E-05 3.6E-04 0.8E-05 3.6E-04 0.8E-05 3.6E-04 0.8E-05 3.6E-04 0.8E-05 3.6E-04 0.8E-05 3.6E-04 0.8E-05 3.6E-04 0.8E-05 3.6E-04 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-04 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.8E-05 0.4E-05 0.8E-0	5 2F 1.6E 1.8E 9.9E 2.6E 1.7E 9.8E 2.3 3.8E 0.1 2.8E 5.2E 1.3E
Y Y Y Y N N N N Y Y Y Y Y N N N Y Y Y Y	2.9E-05 3.3f =05 4.7E-08 4.7E-08 1.8E-07 4.7E-08 1.8E-05 1.4E-03 3.5E-05 5.4E-05 1.3E-05 5.4E-06 2.9E-04 9.7E-05 1.1E-07 5.1E-05 5.4E-05 1.1E-07 5.1E-05 5.4E-05 1.1E-07 5.1E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.3E-05 5.4E-05 1.4E-03 1.4E-03 1.4E-05 1.4E-	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	23 23 23 23 24 24 24 24 24 24 23 23 23	3.6E-04 4.1E-04 2.3E-06 5.9E-07 1.9E-04 2.2E-10 0.4E 8.7E-04 2.9E-02 6.4E-05 1.9E-04 2.9E-02 6.4E-05 1.9E-04 0.8E-05 3.6E-0	1.6E 1.8E 9.9E 2.6E 1.7E 9.8E 2.8E 3.8E 0.1 2.8E 5.2E 1.3E
Y Y Y Y Y N N N Y Y Y Y Y Y Y Y Y Y Y Y Y	3 38-05 3 38-05 3 18-05 1.8E-07 1.8E-11 1.9E-02 4 2E-05 1.8E-12 1.9E-02 4 8E-05 1.9E-03 3 5E-06 9.7E-05 1.3E-05 2.8E-06 9.7E-05 1.3E-05 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 2.8E-06 1.9E-02 3.8E-05 2.8E-06 1.9E-04 3.8E-05 2.8E-06 1.9E-04 3.8E-05 2.8E-06 1.9E-04 3.8E-06 2.8E-06 1.9E-04 3.8E-05 2.8E-06 1.9E-04 3.8E-05 2.8E-06 1.9E-04 3.8E-05 2.8E-06 3.8E-05 2.8E-06 3.8	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	23 23 23 24 24 24 24 24 24 23 23 23 23 23	4.1E-04 2.3E-06 5.9E-07 3.9E-04 2.2E-10 0.4 8.7E-04 2.9E-04 2.9E-04 2.9E-04 2.9E-04 2.9E-04 0.8E-05 3.6E-05 3.6E-05	1.8E 9.9E 2.6E 1.7E 9.8E 2. 3.8E 0.1 2.8E 5.2E 1.3E
1         ∀           Y         Y           N         N           N         N           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         N           N         N           Y         Y           Y         Y           Y         N           Y         N           Y         N           Y         N           Y         N           Y         N           Y         N           Y         N           Y         N           Y         N	1.8E-07 4.7E-08 1.8E-11 1.9E-05 1.8E-11 1.9E-02 4.8E-05 2.8E-06 1.5E-05 5.4E-05 5.4E-05 5.4E-05 5.4E-05 3.8	Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru	23 23 26 24 24 24 24 24 23 23 23 23	2.3E-06 5.9E-07 3.9E-04 2.2E-10 0.4E 8.7E-04 2.9E-04 2.9E-04 1.9E-04 2.9E-04 1.9E-04 2.9E-04 0.8E-05 3.6E-0	9.9E 2.6E 1.7E 9.8E 2. 3.8E 0.1 2.8E 5.2E 1.3E
Y Y N N N Y Y Y Y Y Y N N N Y Y Y Y Y Y Y Y Y Y Y Y Y	4 / F 200 3 / F < 20 1 / F < 20 1 / F < 05 1 / F < 05 2 / F < 05 3 / F < 05 2 / F < 05 3 / F <	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	23 23 26 24 24 24 23 23 23 23	5.9E-07 2.9E-04 2.2E-10 0.4E 8.7E-04 2.9E-04 2.9E-04 2.9E-04 0.8E-05 3.6E-0	2.6E 9.8E 2.3.8E 0.1 2.8E 5.2E 1.3E
Y         N           N         N           N         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         N           N         N           N         N           N         N           N         N           Y         Y           N         N           Y         Y           N         N           Y         Y           Y         N           Y         N           Y         N           Y         N           Y         N           Y         N           Y         N	3.12-03 1.82-11 1.92-02 4.82-05 1.62-03 1.52-05 2.12-05 3.42-06 2.92-04 9.72-05 3.12-05 3.12-05 3.12-05 3.12-05 3.25-05 3.25-05 3.25-05 3.25-05 3.2	Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru Ib/MMBru	2,3 2,6 2,4 2,4 2,4 2,4 2,3 2,3 2,3 2,3 2,3 2,3 2,3 2,3 2,3 2,3	2.2E-10 0.4 8.7E-04 2.9E-02 6.4E-05 1.9E-04 2.9E-04 0.8E-05 3.6E-03 3.6E-03	1.7E 9.8E 2.3.8E 0.1 2.8E 5.2E 1.3E
N N N V Y Y Y Y Y N N N N V V V Y V V V V	1.9 -02 4.8 -05 1.6E-03 3.5 -05 1.5E-05 3.4E-06 2.9E-04 9.7E-05 1.1E-07 5.1E-06 3.8E-05 2.7E-05 2.7E-05 3.8E-05 1.3E-06 1.9E-01 3.8E-05 1.3	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	2,3 2,4 2,4 2,4 2,3 2,3 2,3 2,3 2,3 2,3 2,3 2,3 2,3 2,3	2.2E-10 0.4 8.7E-04 2.9E-04 6.4E-05 1.9E-04 2.9E-04 6.8E-05 3.6E-03	9.8E 2.3.8E 0.1 2.8E 5.2E 1.3E
N N N Y Y Y Y Y Y N N N N N N N Y Y Y Y Y Y Y Y Y Y Y Y Y	1.5 -02 1.6E-03 1.5E-05 1.5E-05 2.1E-05 2.4E-06 2.9E-04 9.7E-05 1.1E-07 5.1E-06 3.8E-05 3.8E-05 2.7E-05 8.2E-09 1.3E-04 1.8E-04 1.9E-01 1.9E-01 1.9E-01 1.9E-04 1.9E-04 1.9E-04 1.9E-04 1.9E-04 1.9E-04 1.9E-04 1.9E-04 1.9E-04 1.9E-05 1.9	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	2.6 2.4 2.4 2.3 2.3 2.3 2.3 2.3	8.7E-04 2.9E-02 6.4E-05 1.9E-04 2.9E-04 2.9E-04 3.6E-05 3.6E-05	3.8E 0.1 2.8E 5.2E 1.3E
N N Y Y Y Y Y Y N N N N N N N V Y Y Y Y Y Y Y Y Y Y	1.6E-03 1.5E-05 1.5E-05 2.1E-05 2.4E-06 2.9E-05 1.1E-07 5.1E-05 1.1E-07 5.8E-05 2.7E-05 8.2E-05 1.3E-04 2.8E-06 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-01 1.9E-05 1.9E-06 1.9E-05 1.9	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	24 24 23 23 23 23 23	2 9E-02 6 4E-05 1 9E-04 2 9E-04 2 9E-04 6 8E-05 3 6E-05	0.1 2.8E 5.2E 1.3E
N         Y           Y         Y           Y         Y           Y         Y           Y         N           N         N           Y         Y           N         Y           N         Y           Y         Y           N         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y	3 5 06 1.5 05 2 1-05 2 4-05 2 9-04 9.7E-05 1.1E-07 5 1.2E-07 5 1.2E-07 3 8E-05 2 76-05 8 2E-09 1.3E-04 2 8E-06 1.9E-01 9-04 9 -05 1.3E-05 1.3E-07	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	2.4 2.3 2.3 2.3 2.3	6 4E-05 1 95-04 2 95-04 6 85-05 3 65-03	2.8E 5.2E 1.3E
Y         Y           Y         Y           Y         Y           Y         N           Y         N           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           N         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y	1.52-05 2.15-05 2.95-04 9.75-05 1.16-05 1.16-05 1.16-05 3.82-05 2.77-05 8.22-09 1.38-04 2.85-06 1.95-01 9.65-2	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	2.3 2.3 2.3 2.3	1 95-04 2 95-04 6 85-05 3 65-03	5.2E 1.3E
Y           Y           Y           Y           Y           N           N           N           Y           N           Y           N           Y           N           Y           N           Y           N           Y           N           Y           N           Y           N           Y           N           Y           N           Y           N	2 1 - 05 5,4E-06 2 0F-04 9,7E-05 1,1E-07 5 1E-06 3 8E-05 2 7E-05 8 2E-05 8 2E-05 1,3E-04 1,3E-04 1,3E-04 1,3E-06 1,9E-01 1,3E-06 1,3E-06 1,3E-05 1,	Ib/MBtu Ib/MBtu Ib/MBtu Ib/MBtu Ib/MBtu Ib/MBtu Ib/MBtu Ib/MBtu	2.3 2.3 2.3 2.3	2.9E-04 6.8E-05 3.6E-03	1.3E
Y Y N N N N V N N Y Y V N N Y V N N Y V N N V N N V N N V N N V N N V N N V N N V N N N V N	5,4E-06 2 9F-04 9,7E-05 1,1E-07 5 1E-08 3 8E-05 2 7f-05 8 2E-09 1 3E-04 2 8E-06 1 9E-01	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	23	6.8E-05 3.6E-03	4.30
Y Y N V N N N Y V N N Y V Y N N Y V Y N N Y V N V Y N V V N V V N V V N V V N V V N V V N V V N V V N V V V N V	2 9F-04 9.7E-05 1.1E-07 5 1E-06 3 8E-05 2.7E-05 8.2E-09 1.3E-04 2.8E-06 1.9E-01 9.6E-2	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	2.3	36-03	[1] S. Dire
Y N N N Y Y Y Y Y Y V N Y Y	9.7E-05 1.1E-07 5.1E-05 3.8E-05 2.76-05 8.2E-09 1.3E-04 2.8E-06 1.9E-01 9.5C	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	2.3	1 35 03	1 65
N N N V N V V V V V V V V V V V V V V V	1.1E-07 5.1E-08 3.8E-05 2.7E-05 8.2E-09 1.3E-04 2.8E-06 1.9E-01 9.6E-03	Ib/MMBtu Ib/MMBtu Ib/MMBtu Ib/MMBtu	7.4	a second a s	5 36
Y N N Y Y Y N Y Y	1.1E-07 51E-08 3.8E-05 8.2E-09 1.3E-04 2.8E-06 1.9E-01	Ib/MMBtu Ib/MMBtu Ib/MMBtu		6.0F-04	2.6F
N N V N V Y V N Y V V V V	51E-08 38E-05 27E-05 82E-09 13E-04 28E-06 19E-01	Ib/MMBru Ib/MMBtu	2.3	1.4E-06	6.05
N N Y Y Y Y N Y Y	3 8E+05 2 70-05 8 2E+09 1 3E+04 2 8E+06 1 9E+01	Ib/MMBtu	2	1.3E-05	5.6F-
N V N Y Y Y Y Y	2.76-05 8.2E-09 1.3E-04 2.8E-06 1.9E-01	the second se	2	9.5E-03	4.2F
Y N Y Y Y N Y	8.2E-09 1.3E-04 2.8E-06 1.9E-01	Ib/MMBtu	2.4	4.9E-04	2.1E
N Y Y Y N Y	1.3E-04 2.8E-06 1.9E-01	Ib/MMBtu	2,3	1.0E-07	4.5E
Y Y Y N Y	2.8E-06 1.9E-03	/b/MMBRU	2	3.1E-02	0.1
Y Y N Y	1.9E-01	Ib/MM u	2,4	5.1E-05	2.2E
Y N Y	0.00-0	.ib/MMBtu	2.3	2.4E-02	0.1
Y Y Y	6.6t-12	1b/MMBtu	23	1.1E-10	4.78-
Y	3.0E-05	Ib/MMBrid	2,3	3.8E-04	1.6E-
<u>Y</u>	1.15-05	Ib/MMBru	2	7.8E-D3	3.4E-
	3.0E-05	Ib/MMBbu	2,3	3,8E-04	1.6E-
	4.15-05	Ib/MMBtu	2.3	51E-04	2.26-
Y	2.2E-08	ID/MMBEW	2.3	2.8E-07	1 2E-
Y	1.8E-05	lb/MMBtu	2,3	2.3E-04	9.9E-
Y	2.5E-05	Ib/MMBtu	2,3	3.1E-04	1.4E-
voc	Factor	Units	Footnote	Emis	sions
				(lb/hr)	(tpy
Y	2.4E-05	Ib/MMscf	- 2	7.5E-07	3.3E-
Y	1.ME-06	Ib/MMscf	7	5.6 -08	2.5E-
Y	1.6E-05	Ib/MMscf	7	5.02-07	2.28-
Y	1.05-00	15/MMscf	7	5.6E-08	2.5E-
Y	1.8E-05	Ib/MMscf	- 7	5.6E-08	2.5E-
	1.55-05	D/MMacr		4.8=-07	2.1E-
M	1.02-03	ib/MPISCF		5.62-071	2.58-
N I	245.05	thousand .		2 55 26	3 25
N	2.05-04	Ib MANAger	- 2	6 25 06	3.75
Y.	1.85-06	Ib/MMecf	7	0.3E-00	3.55
	215-03	In MMsef	7	5 6E-DE	2.05
Y	1 2E-06	Ib/MMecf	7	2.05-03	1.65
Y		Th/MMarf	7	5.65.09	7.65
Y Y Y	1.8E-D6	fb/MMerf	7	3.85-00	1.65
Y Y Y Y	1.8E-06	Ib/MMart	7	5.6E-MR	2.5E
Y Y Y Y	1.8E-06 1.2E-06	Ib/MMecf	7	3.8 -07	1.65.
Y Y Y Y Y	1.8E-06 1.2E-06 1.8E-06 1.2E-05	- AM ( 1 * A)* (20 * 1)	7	3.55-05	1.5F-
Y Y Y Y Y N	1.8E-06 1.2E-06 1.8E-06 1.2E-05 1.1E-03	ib/MMscf			1.00
Y Y Y Y N N	1.8E-06 1.2E-06 1.3E-06 1.2E-05 1.1E-03 1.4E-03	ib/MMscf ib/MMscf	- 2	4.4 -05	1.954
Y Y Y Y N N Y	1.8E-06 1.2E-06 1.8E-06 1.2E-05 1.1E-03 1.4E-03 1.8E-06	Ib/MMscf Ib/MMscf Ib/MMscf	7	4.4E-05 5.6E-08	2.5E-
Y Y Y Y N N N Y	1.8E-06 1.2E-06 1.2E-05 1.1E-03 1.4E-03 1.8E-06 0.4E-05	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	7	4.4E-05 5.6E-08 2.6E-06	2.5E-
Y Y Y Y Y N N N N Y Y	1.8E-06 1.2E-06 1.2E-05 1.1E-03 1.4E-03 1.8E-06 0.4E-05 1.2E-06	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	7 7 7 7	4.4E-05 5.6E-08 2.6E-06 3.8E-08	2.5E- 1.2E- 1.6E-
Y Y Y Y N N N N Y Y Y	1.8E-06 1.2E-05 1.2E-05 1.1E-03 1.4E-03 1.8E-06 0.4E-05 1.2E-06 1.2E-01	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	7 7 7 7 7 7	4.4E-05 5.6E-08 2.6E-06 3.8E-08 3.8E-05	2.5E- 121- 1.6E- 1.6E-
Y Y Y Y N N N N Y Y Y	1.8E-06 1.2E-06 1.8E-06 1.2E-05 1.1E-03 1.4E-03 1.8E-06 0.4E-05 1.2E-06 1.2E-01 3.0E-06	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	7 7 7 7 7 7	4.4E-05 5.6E-08 2.6E-08 3.8E-08 3.8E-05 9.4E-08	2.5E- 1.2E- 1.6E- 1.6E- 4.1E-
Y Y Y Y N N N N Y Y Y Y	1.8E-06 1.2E-06 1.2E-06 1.2E-05 1.2E-05 1.2E-03 1.4E-03 1.8E-06 0.4E-05 1.2E-06 1.2E-06 3.0E-06 2.8E-06	b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf	7 7 7 7 7 7 7 7 7 7 7	4.4E-05 5.6E-08 2.6E-06 3.8E-08 3.8E-05 9.4E-08 8.8E-08	2.5E- 121- 1.6E- 4.11- 3.8E-
Y Y Y Y N N N Y Y Y Y Y	1.8E-06 1.2E-06 1.2E-06 1.2E-05 1.1E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-05 1.2E-06 1.2	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	777777777777777777777777777777777777777	4.4E-05 5.6E-08 2.6E-06 3.8E-08 3.8E-05 9.4E-08 8.8E-08 2.4E-03	12- 10E- 1.6E- 4.11- 3.8E- 1.0E-
Y Y Y Y N N N N Y Y Y Y Y Y Y	18E-06 12E-06 1.2E-06 1.2E-05 1.1E-03 1.4E-03 1.8E-06 8.4E-05 1.2E-03 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-05 1.2E-06	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	777777777777777777777777777777777777777	4.4 -05 5.6E-08 2.6E-06 3.8E-05 9.4E-08 8.8E-08 2.4E-03 5.6E-02	.5E- 12 - 16E- 1.6E- 3.8E- 10E- 0.25
Y Y Y Y N N N Y Y Y Y Y	1.8E-06 1.2E-06 1.2E-06 1.2E-05 1.1E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.2E-06 1.2E-06 1.2E-06 1.2E-02 1.3E-06 1.2E-02 1.3E-06 1.2E-01 1.3E-06 1.2E-01 1.3E-06 1.2E-01 1.3E-05 1.2	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	7 7 7 7 7 7 7 7 7 7 7 7	4.4E-05 5.6E-06 1.8E-08 3.8E-05 7.4E-08 8.8E-08 1.4E-03 5.6E-02 5.6E-02 5.6E-02	2.5E- 1.2 - 1.6E- 1.6E- 1.10E- 1.0E- 0.25 2.5E-1
Y Y Y Y N N N Y Y Y Y Y Y	1.8E-06 1.2E-06 1.2E-06 1.2E-05 1.1E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-03 1.4E-06 1.2E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.8E-06 1.2E-05 1.2E-05 1.4E-03 1.4E-04 1.4E-06 1.4	ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf ib/MMscf	2 7 7 7 7 7 7 7 7 7 7 7 7 7	4.4 -05 5.6 -06 3.8 -05 3.8 -05 9.4 -08 3.8 -08 3.4 -03 5.6 -02 5.6 -08 3.6 -05	1.6F- 1.6F- 1.6F- 1.6F- 1.0F- 1.0F- 0.25 2.5F- 6.9F-
·	1.8E-06 1.2E-06 1.2E-06 1.2E-05 1.1E-03 1.4E-04 1.4	Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf Ib/MMscf	777777777777777777777777777777777777777	4.4F-05 5.6F-08 2.6E-08 3.8F-08 3.8F-08 7.4F-08	.5E- 12- 1.6E- 1.6E- 1.0E- 0.25 0.25 5.9E- 5.9E- 5.9E-
Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	1.8E-06 1.2E-06 1.2E-06 1.2E-05 1.2E-05 1.2E-03 1.4E-03 1.8E-06 0.4E-03 1.2E-03 1.2E-03 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-06 1.2E-05 1.2	ib/MMscf ib/Mmscf ib/	777777777777777777777777777777777777777	4.4 - 05 5.6 - 08 2.6 - 06 3.8 - 08 3.8 - 05 9.4 - 03 9.4 - 03 5.6 - 02 5.6 - 02 5.6 - 03 1.6 - 05 1.2 - 05 8.2 - 05	.5E- 1.6E- 1.6E- 1.6E- 3.8E- 0.25 - 6.9E- 5.2E- 3.6E- 5.2E- 3.6E-
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	1.88-06 1.22-06 1.22-06 1.22-06 1.22-06 1.22-06 1.22-06 1.22-03 1.45-03 1.45-03 1.45-03 1.45-06 1.22-07 1.22-06 1.22-0	b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf b/MMscf	777777777777777777777777777777777777777	4.4 -05 5.62-08 2.6E-06 3.8E-05 9.4E-08 8.8E-08 3.6E-02 5.6E-02 5.6E-02 5.6E-02 5.6E-03 1.2E-05 6.6E-05 5.6E-05 5.6E-05	1.5E= 1.6E= 1.
· · · · · · · · · · · · · ·	1.187-06 1.27-06 1.27-06 1.27-05 1.18-06 0.47-05 1.27-06 1.27-	b/Mmscf b/Mmscf	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	4.4F-05 5.6E-06 3.8E-05 3.8E-05 9.4F-03 5.6E-02 5.6E-08 1.6E-05 1.2E-05 8.2E-06 1.9E-05 6.6E-05 5.3E-07 1.6E-07	1.65- 1.65- 1.65- 1.65- 1.05- 0.25- 0.95- 5.1- 0.95- 0.95- 0.45-0.45-0.45-0.45-0.45-0.45-0.45-0.45-
· Y Y Y Y Y Y Y Y Y Y Y Y Y	1 88-06 1 27-06 1 27-06 1 27-06 1 27-05 1 27-05 1 27-05 1 28-06 1 27-05 1 28-06 1 28-06 1 28-06 5.07-06 1 28-06 5.07-06 1 28-06 5.07-04 2 88-06 5.07-04 2 88-06 5.07-04 2 88-04 2 88-04 2 88-04 2 177-05 5.07-06	b/Mmscf b/Mmscf	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	4.4 -05 5.6 -08 3.8 -08 3.8 -05 3.8 -08 3.8 -08 3.8 -08 3.8 -08 3.8 -08 3.6 -08 5.6 -05 5.5 -08 5.6 -07 7.6 -05 5.6 -07 7.6 -05 5.6 -07 7.6 -05 7.6 -07 7.5 -0	1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6
А         М         А         М         А         М         А         А         М         А         А         М         А         А         М         А         А         М         В	1.38-06 1.27-06 1.27-06 1.27-05 1.27-05 1.38-06 3.48-03 1.48-03 1.48-06 3.48-06 1.27-06 1.27-06 1.27-06 1.27-06 1.27-06 1.27-06 1.27-06 1.28-06 3.38-04 3.38-04 5.07-04 3.38-04 5.07-04 3.38-04 5.07-05 5.07-0	Ib/Misci Ib/Misci	7777777777777777777	4.4E-05 5.6E-08 3.8E-08 3.8E-08 3.8E-08 3.8E-08 8.8E-08 8.8E-08 1.4E-03 5.6E-02 1.2E-05 6.6E-02 1.2E-05 6.6E-05 5.6E-02 1.2E-05 6.6E-05 5.6E-02 1.2E-05 6.6E-05 5.5E-07 1.6E-07 7.5E-07	2.5E- 1.6E- 1.6E- 1.6E- 1.6E- 1.6E- 3.8E- 1.0E- 0.2E- 0.9E- 0.
А	1.187-06 1.27-06 1.27-06 1.27-05 1.27-05 1.27-05 1.27-05 1.27-05 1.27-06 1.27-	Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest Ib/Milest	7777777777777777	4.4E-05 5.6E-08 3.8E-08 3.8E-05 7.4E-08 8.8E-08 2.4E-03 5.6E-02 5.6E-02 5.6E-02 5.6E-02 5.5E-05 5.3E-07 1.6E-07 7.5E-07 7.5E-07	2.5E- 1.6E- 1.6E- 1.6E- 1.6E- 1.6E- 0.22 0.22 0.9E- 0.9E
· Y Y Y Y Y Y Y Y Y Y Y Y Y	1.38-06 1.28-06 1.28-06 1.28-06 1.28-06 1.28-05 1.48-03 1.48-03 1.48-03 1.48-03 1.48-03 1.48-03 1.48-03 1.48-03 1.28-06 1.28-04 1.28-05 1.2	ID/MINSCI ID/MIN	2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	4.4E-05 5.6E-08 3.8E-05 9.4E-02 8.8E-08 3.8E-05 9.4E-02 8.8E-08 3.56E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.6E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-08 1.2E-05 5.5E-	2.5E- 1.6E- 1.
	Y Y Eal HAP tal TAP D C Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y         2.8±05           2.8±05         Emission           ball HAP Emissions         Emission           ball TAP         Emission           Y         2.4±05           Y         2.4±05           Y         2.4±05           Y         1.6±05           Y         1.4±00           Y         1.4±00           Y         1.4±00           Y         1.4±00           Y         1.4±00           Y         2.4±05           Y         1.4±00           Y         2.4±05           Y         1.8±06           Y         2.4±05           Y         2.4±05           Y         2.4±05           Y         1.8±06           Y         1.2±06           Y         1.2±06           Y         1.2±06           Y         1.8±06	Y         2.82-05         Db/NHBu           Y         2.52-05         Dr/MHBu           Jan HAP Emissions (related to tal TAP Emissions (related to tal TAP Emission Factor         Units           Y         2.4E-05         b/MHSci           Y         2.4E-05         b/MHSci           Y         1.4E-06         b/MHSci           Y         2.4E-06         b/MHSci           Y         1.4E-06         b/MHSci           Y         1.4E-06         b/MHSci           Y         1.4E-06	v         1.82-05         B)/MIRSH,         4.53           v         2.55-05         B)/MIRSH,         2.3           all HAP Emissions (related to biomass)         1.3         Source         1.3           DC         Emissions (related to biomass)         1.6         Source           DC         Emission         Units         Footnote           Y         2.4E-05         B)/Miscf         2           Y         1.4E-06         B)/Miscf         2           Y         1.4E-06         B)/Miscf         7           Y         2.4E-06         B)/Miscf         7           Y	V         1.8E-05         B)/MIRBH         4.3         2.4E-05         2.6E-04           V         2.5E-05         B)/MIRBH         2.3         2.2E-04           all HAP Emissions (related to biomass)         2.1         2.2E-04         2.1           D C         Emissions (related to biomass)         2.1         2.1           D C         Emission         Units         Footnote         Emission           T AP Emission         Factor         Units         Footnote         Emission           T J AP Emission         Factor         Units         Footnote         Emission           T J AF-06         B)/Miscit         7         5.6E-08         7           T J AF-06         B)/Miscit         7         5.6E-07           T J AF-06         B)/Miscit         7         5.6E-08           T J AF-06         B)/Miscit         7         5.6E-07           T J AF-06         B/Miscit         7

Abbreviations:	
CAS - chemical abstract service	N <sub>2</sub> O - nitrous oxide
CH4 - methane	ODT - oven dried tons
CO - carbon monoxide	PM - particulate matter
CO2 - carbon dioxide	PM10 - particulate matter with an aerodynamic diameter less than 10 microns
CO2e - carbon dioxide equivalent	PM2.5 - particulate matter with an aerodynamic diameter of 2.5 microns or less
HAP - hazardous air pollutant	RTO - regenerative thermal oxidizer
hr - hour	SO <sub>2</sub> - sulfur dioxide
kg - kilogram	TAP - toxic air pollutant
lb - pound	tpy - tons per year
MMBtu - Million British thermal units	VOC - volatile organic compound
NC - North Carolina	WESP - wet electrostatic precipitator
NOv - nitrogen oxides	Vr-vear

			Summary of	Potential Emis	ssions from B	aghouses							
			Er Hamlet E	viva Pellets H	lamlet, LLC	-							
		1	Harmey H	I Comona Com	Y, NORTH La	olina							
				Exhaust	Exit Grain	Restinutate	President and			Potential	Emission	s	
Emission Unit	Source Description	Control	Control Device	Flow Rate <sup>1</sup>	Loading	Particulate	speciation	P	M	PN	fin.	PA	f
10		Device ID	Description	(cfm)	(gr/cf)	PM <sub>10</sub> (% of PM)	PM <sub>2.5</sub> (% of PM)	(lb/hr)	(tpy)	(lb/hr)	(фу)	(lb/hr)	(tpy)
ES-HM-1	Dry Hammermill	CD-HM-BH1	One (1) baghouse 3	15,000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-HM-2	Dry Hammermill	CD-HM-BH2	One [1] baghouse <sup>2, 3</sup>	15,000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-HM-3	Dry Hammermill	CD-HM-BH3	One (1) baghouse <sup>2, 3</sup>	15,000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-HM-4	Dry Hammermill	CD-HM-BH4	One (1) baghouse <sup>2,3</sup>	15,000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-MM-5	Dry Hammermill	CD-HM-BH5	One (1) baghouse"	15 000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-HM-7		CD-HM-BH5	One (1) bachouse","	15 000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-HM-8	Doy Hammermill	CD-HM-BHR	One (1) bachouse 23	15,000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-HMC	Hammermill Collection Conveyor	CD-HMC-BH	One (1) bachouse "	15000	0.004	100%	1.7%	0.51	2.3	0.51	2.3	8.7E-03	0.038
ES-PCHP	Pellet Cooler HP Fines Relay System	CD-PCHP-BH	One (1) bachouse <sup>2,4</sup>	500	0.004	100%	100%	0.051	0.075	0.051	0.23	0.051	0.23
ES-PCLP	Pellet Cooler LP Fines Relay System	CD-PCLP-BH	One (1) banhouse <sup>2,4</sup>	3.102	0.004	100%	100%	0.017	0.075	0.017	0.075	0.017	0.075
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BH	One (1) baphouse <sup>2,4</sup>	2,444	0.004	100%	100%	0.084	0.37	0.084	0.37	0.084	0.47
ES-CLR-1	Pellet Cooler	CD-CLR-BH1	One (1) baghouse <sup>5</sup>	15,000	0.004	26.1%	3.2%	0.51	2.3	D.13	0.59	0.016	0.072
ES-CLR-2	Pellet Cooler	CD-CLR-BH2	One (1) baghouse <sup>1</sup>	15,000	0.004	26.1%	3.2%	0.51	2.3	0.13	0.59	0.016	0.072
ES-CLR-3	Pellet Cooler	CD-CLR-BH3	One (1) baghouse <sup>5</sup>	15,000	0.004	26.1%	3.2%	0.51	2.3	0.13	0.59	0.016	0.072
ES-CLR-4	Pellet Cooler	CD-CLR-BH4	One (1) baghouse <sup>5</sup>	15,000	0.004	26.1%	3.2%	0.51	2.3	0.13	0.59	0.016	0.072
ES-CLR-5	Pellet Cooler	CD-CLR-BH5	One (1) baghouse <sup>5</sup>	15,000	0.004	26.1%	3.2%	0.51	2.3	0.13	0.59	0.016	0.072
ES-CLR-6	Pellet Cooler	CD-CLR-BH6	One (1) baghouse <sup>s</sup>	15,000	0.004	26.1%	3.2%	0.51	2.3	0.13	0.59	0.016	0.072
ES-DCTB	Pellet Dust Collection Transfer Bin	CD-PDCTB-BH	One (1) bachouse <sup>2,4</sup>	3,000	0.004	100%	100%	0.10	0.45	0.10	0.45	0.10	0.45
ES-PB+1 and 2	Two (2) Pellet Loadout Bios	CD-FPH-BH	One (1) baghouse <sup>3,6</sup>	8,500	0.004	91%	1.7%	0.29	1.3	0.27	1.2	5.0E-03	0.022
	Dried Wood Handling-Operations	CD-DWH-BH1	One (1) bachouse <sup>2,4</sup>	1.000	0.004	100%	100%	0.024	0.15	0.024	0.15	0.024	0.45
ES-DWH	(conveyors)	CD-DWH-BH2	One (1) bachouse <sup>2,4</sup>	1,000	0.004	100%	100%	0.034	0.15	0.034	0.15	0.034	0.15
ES-ADD	Additive Handling and Storage	CD-ADD-BH	One (1) baghouse <sup>2,4</sup>	1.000	0.004	100%	100%	0.034	0.15	0.034	0.15	0.034	0.15
		1		1			100 //	01034	0.15	0.034	0.15	;	0.15
tes:								-		1			
Control device	flow rate (cfm) based on updated emi	ssion point data	provided by Enviva on 3	3/16/18.	1	_							
No speciation d	ata is available for PM10. Therefore, it	is conservativel	y assumed to be equal	to total PM.									
Dry Hammermill	is and finished product handling PM2.5	speciation based	1 on April 2014 Enviva S	outhampton P	M <sub>2.5</sub> speciation	tests.	1						
No speciation d	ata is available for PM2.5. Therefore, it	the second se								1			
		t is conservative	ly assumed to be equal	to total PM.	1					1			
Exit flow rate p	rovided by Enviva. Exit grain loading a	ssumed to be th	ly assumed to be equal e same as for other bar	to total PM. ghouses at the	a facility. A sin	gle wet scrub	ber may be us	sed in plac	e of the s	         	ouses for	PM control	. The
Exit flow rate p emissions are e	rovided by Enviva. Exit grain loading a expected to be the same whether the	ssumed to be th scrubber or bag	ly assumed to be equal le same as for other bac houses are installed. Ba	to total PM. ghouses at the ghouse or scr	e facility. A sin ubber emissio	gle wet scrub ns will exhaus	per may be us at through CD	ed in plac -RCO.	e of the s	ix (6) bagh	 ouses for	PM control	. The
Exit flow rate p emissions are e Finished produc	rovided by Enviva. Exit grain loading a expected to be the same whether the t handling PM10 speciation based on e	ssumed to be th scrubber or bag	ly assumed to be equal le same as for other bac houses are installed. Ba for wet wood combustion	to total PM. ghouses at the ghouse or scr on controlled b	e facility. A sin ubber emissio y a mechanica	gle wet scrubi ns will exhaus I separator fro	ber may be us at through CD	ed in plac -RCO. ction 1.6 -	e of the si Wood Res	ix (6) bagh	ouses for	PM control Bollers, 09	. The /03.
Exit flow rate p emissions are e Finished produc Because the pa	rovided by Enviva. Exit grain loading a expected to be the same whether the t handling PM <sub>10</sub> speciation based on e riticle size of particulate matter from fi	ssumed to be the scrubber or bag mission factors nished product h	ly assumed to be equal le same as for other bach houses are installed. Bach for wet wood combustion andling is anticipated to	to total PM. ghouses at the aghouse or scr on controlled b o be larger that	e facility. A sin ubber emissio y a mechanica in flyash, this	gle wet scrub ns will exhaus I separator fro factor is believ	per may be us at through CD om AP-42, Served to be a co	sed in plac -RCO. tion 1.6 -	e of the si Wood Res e Indicator	ix (6) bagh sidue Comb	ouses for oustion in ion.	PM control Bollers, 09	. The /03.
Exit flow rate p emissions are e Finished produc Because the pa	rovided by Enviva. Exit grain loading a expected to be the same whether the # handling PM <sub>10</sub> speciation based on e rticle size of particulate matter from fi	scubber or bag mission factors nished product h	ly assumed to be equal re same as for other bay houses are installed. Ba for wet wood combustio andling is anticipated to	to total PM. ghouses at the ghouse or scr on controlled b b be larger tha	e facility. A sin ubber emissio y a mechanica in flyash, this	gle wet scrub ns will exhaus I separator fro factor is believ	per may be us at through CD om AP-42, Served to be a co	ed in plac -RCO. tion 1.6 -	e of the si Wood Res e Indicator	ix (6) bagh sidue Comb r of speciat	ouses for oustion in ion.	PM control Bollers, 09	. The /03.
Exit flow rate p emissions are e Finished produc Because the pa breviations:	rovided by Enviva. Exit grain loading a xpected to be the same whether the $\pm$ handling $PM_{10}$ speciation based on $\epsilon$ rticle size of particulate matter from fi	Inision factors	ly assumed to be equal le same as for other ba- houses are installed. Ba for wet wood combustic landling is anticipated to	to total PM. ghouses at the aghouse or scr on controlled b o be larger tha i	e facility. A sin ubber emissio y a mechanica n flyash, this	gle wet scrub ns will exhaus I separator fri factor is belle	ber may be us st through CD om AP-42, Ser yed to be a co	sed in plac -RCO. tion 1.6 -	e of the si Wood Res e Indicator	ix (6) bagh sidue Comb	ouses for pustion in ion.	PM control Bollers, 09	. The /03.
Exit flow rate previous flow rate previous flow rate produces for the produce flow rate previous flow rate	rovided by Envive. Exit grain loading a expected to be the same whether the x handling PM <sub>10</sub> speciation based on e rticle size of particulate matter from fi ner minute	issumed to be th scrubber or bag imission factors nished product h	ly assumed to be equal le same as for other ba- houses are installed. Ba for wet wood combustio landling is anticipated to	to total PM. ghouses at the ghouse or scr on controlled b o be larger tha l l b - pound	e facility. A sin ubber emissio y a mechanica in flyash, this	gle wet scrub ns will exhaus I separator fri factor is belle	ber may be us st through CD om AP-42, Ser yed to be a co	sed in plac -RCO. ction 1.6 - onservative	e of the si Wood Res e Indicator	ix (6) bagh	ouses for pustion in ion.	PM control Boilers, 09	. The /03.
Exit flow rate pi emissions are e Finished produc Because the pa breviations: cf - cubic feet cfm - cubic feet ES - Emission S	rovided by Envive. Exit grain loading a stypetted to be the same whether the thandling PM <sub>10</sub> speciation based on rticle size of particulate matter from fi per minute	issumed to be th sscubber or bag imission factors nished product h	ly assumed to be equal le same as for other ba- houses are installed. Ba for wet wood combustic landling is anticipated to	to total PM. ghouses at the ghouse or scr on controlled b b be larger tha l lb - pound PM - particula	e facility. A sin ubber emissio y a mechanica in flyash, this te matter	gle wet scrub ns will exhaus I separator fra factor is belle	ber may be us st through CD om AP-42, Ser yed to be a co	ed in plac -RCO. ttion 1.6 - onservative	e of the si Wood Res e Indicator	sidue Comb	ouses for oustion in ion.	PM control Bollers, 09	. The /03.
Exit flow rate p emissions are e Finished produc Because the pa breviations: cf - cubic feet cfm - cubic feet ES - Emission S IES - Insignifica	rovided by Envive. Exit grain loading a sxpected to be the same whether the thandling PM <sub>0</sub> speciation based on o rticle size of particulate matter from fi per minute ources a Emission Source	issumed to be th scubber or bag mission factors nished product f	ly assumed to be equal le same as for other ba- houses are installed. Be for wet wood combustic andling is anticipated to	to total PM. ghouses at the ghouse or scr on controlled b o be larger tha lb - pound PM - particula PM - particula	e facility. A sin ubber emissio y a mechanica in flyash, this te matter late matter wi	gle wet scrub ns will exhaus I separator fra factor is bellev th an aerodyn	ber may be us at through CD om AP-42, Ser yed to be a co amic diamete	r less than	e of the si Wood Res e Indicator 10 micro	ix (6) bagh sldue Comb r of speciat	ouses for oustion in ion.	PM control Bollers, 09	. The /03.
Exit flow rate p emissions are e Finished produc Because the pa breviations: cf - cubic feet cfm - cubic feet ES - Emission fica IES - Insignifica pr - grain	rovided by Envive. Exit grain loading a expected to be the same whether the at handling PM <sub>0</sub> speciation based on e rticle size of particulate matter from fi per minute ources nt Emission Source	is conservative issumed to be th scrubber or bag imission factors nished product h	ly assumed to be equal esame as for other ba- houses are installed. Be for wet wood combustic landling is anticipated to	to total PM. ghouses at the ghouse or scr on controlled b o be larger tha []b - pound [PM - particula [PM <sub>10</sub> - particul [PM <sub>25</sub> - particu	e facility. A sin ubber emissio y a mechanica in flyash, this te matter late matter wi late matter w	gle wet scrub ns will exhaus I separator fr factor is beller th an aerodyn ith an aerodyn	per may be us st through CD om AP-42, Se ved to be a co amic diamete amic diamete	eed in plac -RCO. tion 1.6 - onservative r less that er of 2.5 m	e of the si Wood Res e Indicator n 10 micro icrons or l	ix (6) bagh sidue Comb r of speciat ns ess	ouses for oustion in ion.	PM control Bollers, 09	. The /03.
Exit flow rate p emissions are e Finished produc Because the pa breviations: cf - cubic feet cfm - cubic feet ES - Emission S IES - Insignifica gr - grain hr - hour	rovided by Envive. Exit grain loading a sxpected to be the same whether the t handling PM <sub>0</sub> speciation based on o rticle size of particulate matter from fi per minute ources nt Emission Source	is conservative issumed to be the scrubber or bag imission factors nished product t	ly assumed to be equal e same as for other ba- houses are installed. Be for wet wood combustic andling is anticipated to	to total PM. ghouse or scr on controlled b o be larger tha l lb - pound PM - particul PM <sub>10</sub> - particul PM <sub>25</sub> - particu tpy - tons per	e facility. A sin ubber emissio y a mechanica in flyash, this te matter late matter wi late matter w late matter w	gle wet scrub ns will exhaus I separator fr factor is belle th an aerodyn ith an aerodyn	ber may be us st through CD om AP-42, Ser ved to be a co amic diamete namic diamete	r less than er of 2.5 m	e of the si Wood Res Indicator 10 micro icrons or l	ix (6) bagh sldue Comb r of speciat ns ess	ouses for oustion in ion.	PM control Bollers, 09	. The /03.
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Exit flow rate p emissions are e Finished produce Because the pa <u>broviations:</u> cf - cubic feet cfm - cubic feet ES - Emission S ES - Emission S ar - grain hr - hour	rovided by Envive. Exit grain loading a stypected to be the same whether the t handling PM <sub>10</sub> speciation based on c rticle size of particulate matter from fi per minute ources nt Emission Source	a conservative secubber or bag mission factors nished product h	ly assumed to be equal esame as for other ba- houses are installed. Be for wet wood combustic iandling is anticipated to	to total PM. ghouse or scr ighouse or scr on controlled b o be larger tha bob e larger tha PM - particula PM - particula PM - particul tpy - tons per	a facility. A sin ubber emissio y a mechanica in flyash, this te matter late matter wi late matter w late matter w year	gle wet scrubi ns will exhaus I separator fr factor is beller factor is beller th an aerodyn th an aerodyn	ber may be us it through CD om AP-42, Sei ved to be a co amic diamete namic diamete	sed in plac -RCO. ttion 1.6 - onservative r less than er of 2.5 m	e of the si Wood Res e Indicator n 10 micro icrons or l	ix (6) bagh sidue Comb r of speciat ns ess	ouses for pustion in ion.	PM control Bollers, 09	. The /03,
Exit flow rate p emissions are e Finished produc Because the pa <u>broviations:</u> cf - cubic feet cfm - cubic feet ES - Emission S EES - Insignifica gr - grain hr - hour	rovided by Envive. Exit grain loading a sxpected to be the same whether the t handling PM <sub>0</sub> speciation based on a rticle size of particulate matter from fi per minute ources nt Emission Source	a conservative sissumed to be th sarubber or bag mission factors nished product i	ly assumed to be equal e same as for other ba- houses are installed. Be for wet wood combustic landling is anticipated to	to total PM. ghouses at this ighouse or scr on controlled b o be larger that lb - pound lb - pound PM - particul PM <sub>10</sub> - particul PM <sub>23</sub> - particul tpy - tons per	a facility. A sin ubber emissio y a mechanica in flyash, this te matter late matter wi late matter w year	gle wet scrub ns will exhaus 1 separator fr factor is belle th an aerodyn	ber may be us it through CD om AP-42, Sea ved to be a co amic diamete	sed in plac -RCO. tion 1.6 - nservative r less that er of 2.5 m	e of the si Wood Res e Indicator n 10 micro icrons or l	ix (5) bagh sidue Comb r of speciation ns ess	ouses for bustion in ion.	PM control Bollers, 09	. The /03.
Exit flow rate p emissions are e Finished produc Because the pa <u>braviations:</u> cf - cubic feet cfm - cubic feet cfm - cubic feet S - Emission S IES - Insignifica gr _ grain hr - hour	rovided by Envive. Exit grain loading a sxpected to be the same whether the thandling PM <sub>0</sub> speciation based on o rticle size of particulate matter from fi per minute ources nt Emission Source	a conservative sissumed to be th scrubber or bag mission factors inshed product t	ly assumed to be equal esame as for other ba- houses are installed. Be for wet wood combustic andling is anticipated to	to total PM. ghouses at thm ghouse or scr on controlled b o be larger tha 1 10b - pound PM-particula PM <sub>10</sub> - particu tpy - tons per	e facility. A sin ubber emissio y a mechanica in flyash, this te matter ate matter wi late matter w year	gle wet scrub ns will exhaus i separator frr factor is belle th an aerodyn	ber may be us t through CD om AP-42, Se ved to be a co amic diamete	sed in plac -RCO. ttion 1.6 - onservative r less that er of 2.5 m	e of the si Wood Res e Indicator	ix (6) bagh sidue Comb of speciat	ouses for oustion in ion.	PM control Bollers, 09	. The /03,
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Exit flow rate p emissions are e rinished produc Because the pa <u>breviations:</u> of - cubic feet cfm - cubic feet cfm - cubic feet CS - traision S cr _ grain hr - hour 14.74	rovided by Envive. Exit grain loading a stypetted to be the same whether the t handling PM <sub>10</sub> speciation based on a rticle size of particulate matter from fi per minute ources nt Emission Source average pressure, Sampson County	a conservative sissumed to be th scrubber or bag mission factors nished product t	ly assumed to be equal esame as for other ba- houses are installed. Be for wet wood combustic andling is anticipated to	to total PM. ghouses at this ghouse or scr on controlled b o be larger that ib - pound iPM - particula PM <sub>10</sub> - particul tPY - tons per	e facility. A sin ubber emissio y a mechanica in flyash, this te matter late matter w late matter w year	gle wet scrub ns will exhaus I separator fr factor is beller th an aerodyn	ber may be us it through CD om AP-42, See ved to be a co amic diamete namic diamete	sed in plac -RCO. ttion 1.6 - onservative r less thar er of 2.5 m	e of the si Wood Res Indicator	ix (6) bagh sidue Comb r of speciat ns ess	ouses for oustion in ion.	PM control Bollers, 09	. The /03.
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Exit flow rate p emissions are e Finished produc Because the pa <u>breviations:</u> of - cubic feet cfm - cubic feet cfm - cubic feet ES - Emission S IES - Insignifica gr - grain hr - hour 14.74 53 4.89%	rovided by Envive. Exit grain loading a sxpected to be the same whether the t handling PM <sub>0</sub> speciation based on a rticle size of particulate matter from fi per minute ources nt Emission Source average pressure, Sampson County F, mean temp for Sampson County In moisture	A conservative sissumed to be th scrubber or bag mission factors nished product to here a service and the service mission factors nished product to here a service and the service nished product to here a service mission factors nished product to here a service and the service nished product to here a service and the service nished product to here a service and the service nished product to here a service and the service and the service nished product to here a service and the service and the service nished product to here a service and the service and t	ly assumed to be equal e same as for other ba- houses are installed. Be for wet wood combustic andling is anticipated b	to total PM. ghouses at the ghouse or scr on controlled b o be larger tha PM - particula PM - particula PM - particul PM - parti	e facility. A sin ubber emissio y a mechanicaci in flyash, this te matter iate matter wi late matter year	gle wet scrub I separator fr factor is belle th an aerody th an aerody	ber may be us ist through CD m AP 42, Sec ed to be a co amic diamete amic diamete	sed in plac -RCO. titon 1.6 - nservative r less that er of 2.5 m	e of the si Wood Res Indicator	ix (5) baghi of speciat	ouses for pustion in ion.	PM control Bollers, 09	. The /03.
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Exit flow rate p emissions are e Finished produc Because the pa <u>breviations:</u> of - cubic feet cfm - cubic feet ES - Emission S ES - Insignifica gr - grain hr - hour 14.74 13.000 iversions 60	rovided by Envive. Exit grain loading a scrpetted to be the same whether the thandling PM <sub>0</sub> speciation based on a riticle size of particulate matter from fi per minute ources nt Emission Source average pressure, Sampson County F, mean temp for Sampson County In moisture dscfm min = 1 hour	A conservative     security of the test security of t	ly assumed to be equal esame as for other ba- houses are installed. Be for wet wood combustic andling is anticipated b	to total PM. ighouse at the ighouse or scr in controlled b o be larger tha Ib - pound Ib - pound IPM - particula PM <sub>10</sub> - particul PM <sub>20</sub> - particul PM <sub>20</sub> - particul	e facility. A sin ubber emissio y a mechanica in flyash, this te matter ate matter will late matter will ate matter will a sin matter will	gle wet scrub I separator fr factor is belle th an aerodyn th an aerodyn	ber may be us st through CD m AP 42, Sec ed to be a cc amic diamete amic diamete	ed in plac- RCO. tilon 1.6 - onservative r less that er of 2.5 m	e of the si Wood Res a Indicator	ix (6) bagh sldue Comb of speciat	ouses for oustion in ion.	PM control Bollers, 09	. The /03,
Exit flow rate p emissions are e Finished produc Because the pa <u>breviations:</u> of - cubic feet cfm - cubic feet cfm - cubic feet ffm - cubic feet ffm - cubic feet ffm - cubic feet ffm - pour tr - hour 14.74 53 4.89% 13000 vversions 60 7000	rovided by Envive. Exit grain loading a sypected to be the same whether the t handling PM <sub>10</sub> speciation based on c rticle size of particulate matter from fi per minute ources nt Emission Source average pressure, Sampson County In moisture dscfm min = 1 hour grains = 1 lb	A conservative sissumed to be the scrubber or bag mission factors inshed product to mished product to March 1	ly assumed to be equal esame as for other ba- houses are installed. Be for wet wood combustic andling is anticipated to	to total PM. sphouse or scr on controlled b o be larger than Ib - pound PM - particula PM - particula P	e facility. A sin ubber emission y a mechanication in flyash, this te matter ate matter will late matter will late matter will ate matter will ate matter will ate matter will ate matter will ate matter will ate matter will ate ate will ate matter will atter will atter w	gle wet scrub ns will exhaus I separator fr factor is belie th an aerodyn	ber may be us it through CD om AP-42, Sec ed to be a co amic diamete namic diamete	r less that	e of the si Wood Res e Indicator	ix (6) bagh sidue Comb r of speciat ns ess	ouses for pustion in ion.	PM control Bollers, 09	. The

		Table	6			
	Dry Hammerm	nill Potential V	OC and HA	P Emissions		
		ES-HM-1 th	rough 8			
	En	viva Pellets H	lamlet, LLC			
	Hamlet, R	ichmond Cou	nty, North C	arolina		
Calculation Basis						
Hourly Throughput	68	ODT/hr				
Annual Throughput	531,259	ODT/yr				
Hours of Operation	8,760	hr/vr				
Potential VOC and HAP	Emissions					
Pollutant	CAS No.	NC TAD	VOC	Emission	Potential	Emissions
Fondant	CAS NO.	INC TAP	VUC	(lb/ODT)	(lb/hr)	(tov)
Acetaldehyde	75-07-0	Y	Y	0.0091	0.62	2.4
Acrolein	107-02-8	Y	Y	0.011	0.73	2.9
Formaldehyde	50-00-0	Y	Y	0.0080	0.55	2.1
Methanol	67-56-1	N	Y	0.0052	0.35	1.4
Phenol	108-95-2	Y	Ŷ	0.0041	0.28	1.1
Propionaldehyde	123-38-6	N	Ý	0.019	1,3	5.0
			Total H	AP Emissions	3.8	15
			Total H	AP Emissions AP Emissions	3.8 2.2	<u>15</u> 8.5
Total VOC			Total H Total T Y	AP Emissions AP Emissions 0.51	3.8 2.2 35	15 8.5 135
Total VOC			Total H Total T Y	AP Emissions AP Emissions O.51	3.8 2.2 35	15 8.5 135
Total VOC <b>tes:</b> Emission factors are base	d on stack testing o	 data from com	Total H, Total T, Y parable Envi	AP Emissions AP Emissions 0.51 va facilities.	3.8 2.2 35	<b>15</b> <b>8.5</b> 135
Total VOC tes: Emission factors are base	d on stack testing o	data from com	Total H, Total T, Y parable Env	AP Emissions AP Emissions 0.51 va facilities.	3.8 2.2 35	<b>15</b> <b>8.5</b> 135
Total VOC tes: Emission factors are base breviations:	d on stack testing o	data from com	Total H/ Total T/ Y parable Envi	AP Emissions AP Emissions 0.51 va facilities.	3.8 2.2 35	15 8.5 135

hr - hour	tpy - tons per year
lb - pound	VOC - volatile organic compound
NC - North Carolina	yr - year

			Table 7			
	Potential VO	C and HAP	Emissions	at Outlet of RCC	) Stack	
		ES-CL	.R-1 throu	igh 6		
		Enviva Pe	ellets Ham	let, LLC		
	Ham	let, Richmor	nd County,	North Carolina		
			1	1		
Calculation Basis						1
Hourly Throughput	80	ODT/hr	1	1		†
Annual Throughput	625,011	ODT/yr	1			1
Hours of Operation	8.760	hr/yr				
Number of Burners	4	burners		+		
		MANADAL /h		1	No. approximation	+ ••
RCO/RTO Burner Rating	8	MMBEU/nr				
RCO/RTO Burner Rating RCO/RTO Control Efficiency	95%	MMBCU/NF				
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant	Potential Process VC	DC and HAP	Emissions	Uncontrolled Emission Factor <sup>1</sup>	Emission	s at RCO et <sup>2</sup>
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant	Potential Process VC	NC TAP	Emissions	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT)	Emission Out	s at RCO let <sup>2</sup>
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Acetaldehyde	Potential Process VC CAS No. 75-07-0	DC and HAP NC TAP	Emissions VOC	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084	Emission Out (Ib/hr) 0.034	s at RCO et <sup>2</sup> (τργ) 0.13
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Acetaldehyde Acrolein	Potential Process VC CAS No. 75-07-0 107-02-8	DC and HAP NC TAP	Emissions VOC Y	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084 0.050	Emission: Out (Ib/hr) 0.034 0.20	s at RCO et <sup>2</sup> (τργ) 0.13 0.79
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Acetaldehyde Acrolein Formaldehyde	8           95%           Potential Process VC           CAS No.           75-07-0           107-02-8           50-00-0	DC and HAP NC TAP Y Y Y	Emissions VOC Y Y Y	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084 0.050 0.031	Emissions Outl (lb/hr) 0.034 0.20 0.12	s at RCO et <sup>2</sup> (tpy) 0.13 0.79 0.49
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Acetaldehyde Acrolein Tormaldehyde Aethanol	Potential Process VC CAS No. 75-07-0 107-02-8 50-00-0 67-56-1	NC TAP	Emissions VOC Y Y Y Y	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084 0.050 0.031 0.24	Emission Out (lb/hr) 0.034 0.20 0.12 0.96	(tpy) 0.13 0.79 0.49 3.8
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Acetaldehyde Acrolein Formaldehyde Methanol Phenol	Potential Process VC CAS No. 75-07-0 107-02-8 50-00-0 67-56-1 108-95-2	DC and HAP NC TAP Y Y N Y N Y	Emissions VOC Y Y Y Y Y Y	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084 0.050 0.031 0.24 0.025	Emission Out (Ib/hr) 0.034 0.20 0.12 0.96 0.10	s at RCO et <sup>2</sup> (tpy) 0.13 0.79 0.49 3.8 0.39
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Accetaldehyde Acrolein Ormaldehyde Aethanol Propionaldehyde	8           95%           Potential Process VC           CAS No.           75-07-0           107-02-8           50-00-0           67-56-1           108-95-2           123-38-6	C and HAP NC TAP Y Y Y N Y N N N	Emissions VOC Y Y Y Y Y Y Y	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084 0.050 0.031 0.24 0.025 0.011	Emission: Out (lb/hr) 0.034 0.20 0.12 0.96 0.10 0.043	s at RCO et <sup>2</sup> (tpy) 0.13 0.79 0.49 3.8 0.39 0.17
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Acetaldehyde Acrolein Formaldehyde Methanol Phenol Propionaldehyde	Rest         8           95%         95%           Potential Process VC         CAS No.           75-07-0         107-02-8           50-00-0         67-56-1           108-95-2         123-38-6	NC TAP Y Y Y Y N Y N N	Emissions VOC Y Y Y Y Y Total	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084 0.050 0.031 0.24 0.025 0.011 HAP Emissions	Emission: Out (lb/hr) 0.034 0.20 0.12 0.96 0.10 0.043 1.5	s at RCO et <sup>2</sup> (tpy) 0.13 0.79 0.49 3.8 0.39 0.17 5.7
RCO/RTO Burner Rating RCO/RTO Control Efficiency Pellet Cooler and Pellet Mill Pollutant Acetaldehyde Acrolein Formaldehyde Methanol Phenol Propionaldehyde	75-07-0           107-02-8           50-00-0           67-56-1           108-95-2           123-38-6	DC and HAP NC TAP Y Y Y N Y N N	Emissions VOC Y Y Y Y Y Total Total	Uncontrolled Emission Factor <sup>1</sup> (Ib/ODT) 0.0084 0.050 0.031 0.24 0.025 0.011 HAP Emissions TAP Emissions	Emissione Outl (lb/hr) 0.034 0.20 0.12 0.96 0.10 0.043 1.5 0.46	s at RCO et <sup>2</sup> (tpy) 0.13 0.79 0.49 3.8 0.39 0.17 5.7 1.8

Emission factors were derived based on stack testing data from comparable Enviva facilities.
 A 95% control efficiency is applied to the potential emissions for the RCO. The pellet coolers will be equipped with an RCO that will operate primarily in catalytic mode with thermal (RTO) mode as a backup. The RTO and RCO modes have the same control efficiency so there will be no impact on emissions during thermal mode usage.

<b>Thermal Generated Potential Crite</b>	ria Pollutant I	Emissions		
Maximum high heating value of VOC Uncontrolled VOC emissions Heat input of uncontrolled VOC emis	constituents sions	1.8E-02 467 17,284	MMBtu/lb tons/yr MMBtu/yr	
Pollutant	Emission	Units	Potenti	al Emissions
	Factor		(lb/hr)	(tpy)
со	8.2E-02	lb/MMBtu <sup>1</sup>	0.16	0.71
NO <sub>x</sub>	9.8E-02	lb/MMBtu <sup>1</sup>	0.19	0.85
Natural Gas Combustion Potential	Criteria Pollut	tant and Gree	enhouse G	as Emissions
Pollutant	Emission	Unite	Potenti	al Emissions
	Factor	onits	(lb/hr)	(tpy)
со	8.2E-02	lb/MMBtu <sup>1</sup>	2.6	12
NOv	0.05.00	IL (MANADA 1	2.1	
	9.85-02	ID/MMBtu-	5.1	14
SO <sub>2</sub>	9.8E-02 5.9E-04	Ib/MMBtu <sup>1</sup>	1.9E-02	14 8.2E-02
SO <sub>2</sub> VOC	5.9E-02 5.4E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup>	1.9E-02 0.17	14 8.2E-02 0.76
SO <sub>2</sub> VOC PM	9.8E-02 5.9E-04 5.4E-03 7.5E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup>	0.17 0.24	14 8.2E-02 0.76 1.0
SO <sub>2</sub> VOC PM PM <sub>10</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup>	1.9E-02 0.17 0.24 0.24	14 8.2E-02 0.76 1.0 1.0
SO <sub>2</sub> VOC PM PM <sub>10</sub> PM <sub>2.5</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup>	3.1 1.9E-02 0.17 0.24 0.24 0.24	14 8.2E-02 0.76 1.0 1.0 1.0
SO <sub>2</sub> VOC PM PM <sub>10</sub> PM <sub>2.5</sub> CO <sub>2</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03 66.9	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> kg/MMBtu <sup>2</sup>	3.1 1.9E-02 0.17 0.24 0.24 0.24 0.24 4,718	14 8.2E-02 0.76 1.0 1.0 1.0 20,666
SO <sub>2</sub> VOC PM PM <sub>10</sub> PM <sub>2.5</sub> CO <sub>2</sub> CH <sub>4</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03 66.9 1.0E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>2</sup> kg/MMBtu <sup>2</sup>	5.1 1.9E-02 0.17 0.24 0.24 0.24 4,718 7.1E-02	14 8.2E-02 0.76 1.0 1.0 1.0 20,666 0.31
SO <sub>2</sub> VOC PM PM <sub>10</sub> PM <sub>2.5</sub> CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> O	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03 66.9 1.0E-03 1.0E-04	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>2</sup> kg/MMBtu <sup>2</sup> kg/MMBtu <sup>2</sup>	3.1 1.9E-02 0.17 0.24 0.24 0.24 4,718 7.1E-02 7.1E-03	14 8.2E-02 0.76 1.0 1.0 20,666 0.31 3.1E-02

<b>Thermal Generated Potential Crite</b>	ria Pollutant I	Emissions		
Maximum high heating value of VOC Uncontrolled VOC emissions Heat input of uncontrolled VOC emis	 constituents   sions	1.8E-02 467 17,284	MMBtu/lb tons/yr MMBtu/yr	
Pollutant	Emission	Units	Potenti	al Emissions
	Factor		(lb/hr)	(tpy)
СО	8.2E-02	lb/MMBtu <sup>1</sup>	0.16	0.71
NO <sub>X</sub>	9.8E-02	lb/MMBtu <sup>1</sup>	0.19	0.85
Natural Gas Combustion Potential	Criteria Pollu	tant and Gree	enhouse G	as Emissions
Pollutant	Emission	Units	Potenti	al Emissions
<u></u>				<u>(ФУ)</u>
	8.2E-02	lb/MMBtu <sup>+</sup>	2.6	12
		1		
NOx	9.8E-02	lb/MMBtu <sup>1</sup>	3.1	14
NO <sub>x</sub> SO <sub>2</sub>	9.8E-02 5.9E-04	lb/MMBtu <sup>1</sup> lb/MMBtu <sup>1</sup>	3.1 1.9E-02	14 8.2E-02
NO <sub>x</sub> SO <sub>2</sub> VOC	9.8E-02 5.9E-04 5.4E-03	lb/MMBtu <sup>1</sup> lb/MMBtu <sup>1</sup> lb/MMBtu <sup>1</sup>	3.1 1.9E-02 0.17	14 8.2E-02 0.76
NO <sub>X</sub> SO <sub>2</sub> VOC PM	9.8E-02 5.9E-04 5.4E-03 7.5E-03	lb/MMBtu <sup>1</sup> lb/MMBtu <sup>1</sup> lb/MMBtu <sup>1</sup> lb/MMBtu <sup>1</sup>	3.1 1.9E-02 0.17 0.24	14 8.2E-02 0.76 1.0
NO <sub>X</sub> SO <sub>2</sub> VOC PM PM <sub>10</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup>	3.1 1.9E-02 0.17 0.24 0.24	14 8.2E-02 0.76 1.0 1.0
NO <sub>x</sub> SO <sub>2</sub> VOC PM PM <sub>10</sub> PM <sub>2.5</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup>	3.1 1.9E-02 0.17 0.24 0.24 0.24	14 8.2E-02 0.76 1.0 1.0 1.0
NO <sub>X</sub> SO <sub>2</sub> VOC PM PM <sub>10</sub> PM <sub>2.5</sub> CO <sub>2</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03 66.9	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> kg/MMBtu <sup>2</sup>	3.1 1.9E-02 0.17 0.24 0.24 0.24 0.24 4,718	14 8.2E-02 0.76 1.0 1.0 1.0 20,666
NO <sub>X</sub> SO <sub>2</sub> VOC PM PM10 PM2.5 CO <sub>2</sub> CH <sub>4</sub>	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03 66.9 1.0E-03	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>2</sup> kg/MMBtu <sup>2</sup>	3.1 1.9E-02 0.17 0.24 0.24 0.24 4,718 7.1E-02	14 8.2E-02 0.76 1.0 1.0 1.0 20,666 0.31
NO <sub>x</sub> SO <sub>2</sub> VOC PM PM <sub>10</sub> PM <sub>2.5</sub> CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> O	9.8E-02 5.9E-04 5.4E-03 7.5E-03 7.5E-03 7.5E-03 66.9 1.0E-03 1.0E-04	Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>1</sup> Ib/MMBtu <sup>2</sup> kg/MMBtu <sup>2</sup> kg/MMBtu <sup>2</sup>	3.1 1.9E-02 0.17 0.24 0.24 0.24 4,718 7.1E-02 7.1E-03	14 8.2E-02 0.76 1.0 1.0 1.0 20,666 0.31 3.1E-02

-				
		Table 8		
	Dried Woo	d Handling Poter	ntial Emissio	ons
		ES-DWH		
	Env	iva Pellets Haml	et, LLC	
	Hamlet, Ric	hmond County,	North Caroli	na
	<b>Calculation Basis</b>			-
	Hourly Throughput <sup>1</sup>	80	ODT/hr	
	Annual Throughput <sup>1</sup>	625,011	ODT/yr	
	Potential Criteria Pollut	ant Emissions		
	Pollutant	Emission Factor	Potentia	l Emissions <sup>1</sup>
		(lb/ODT)	(lb/hr)	(tpy)
	Formaldehyde	8.4E-04	0.067	0.26
	Methanol	2.0E-03	0.16	0.61
	Total	<b>HAP Emissions</b>	0.22	0.87
	VOC as carbon <sup>2</sup>	0.10	8.1	32
	VOC as propane <sup>3</sup>	0.12	9.9	39
<u>N(</u>	Dtes:		L	
1	hammermill throughput.	inputs assumed	to be the sa	me as dry
2.	Emission factors derived (February 2013) for dry v mean emission factors. T Ib/MSF (3/8") to Ib/ODT u content of an OSB panel.	from NCASI's Wo vood handling op he emission facto sing the typical d	od Products perations at a prs were con lensity and n	Database an OSB mill, verted from noisture
3,	VOC as propane = (1.22	x VOC as carbon	) + formaldel	hyde.
AF	hreviations:			
01	hr - hour			
	lb - pound			
	ODT - oven dried tons			
	tpy - tons per year			
	VOC - volatile organic cor	npound		
	yr-year			

			Table 9				
	Em	ergency Ge	erator Pote	ential Emis	sions		
			IES-GN				
		Enviva	ellets Ham	nlet, LLC			
	Ha	mlet, Richm	nd County,	North Care	olina		
Calculation Basis				l			
Engine Output	500	kW					
Horsepower Rating	671	brake hp					
Diesel Heating Value	19,300	Btu/lb					
Hours of Operation	500	hr/yr					
Conversion factor	2,545	Btu/hr/hp			l	Í	
Hourly Fuel Consumption	31.9	gal/hr¹	And the second s				
Energy Input	4.37	MMBtu/hr <sup>2</sup>					1999 I A 199 1

### Notes:

<sup>1</sup> Fuel consumption calculated using a factor of 0.0476 gal/hr-hp. Advanced Environmental Interface, Inc. (1998). General Permits for Emergency Engines. INSIGHTS, 98-2, 3.

<sup>2</sup> Energy calculated on a fuel consumption basis, using an energy factor of 0.137 MMBtu/gal.

Pollutant	Pollutant Emission	Unite	Potential Emissions <sup>1</sup>	
- Onderne	Factor	Units	(lb/hr)	(tpy)
CO <sup>2</sup>	0.39	g/hp-hr	0.58	0.14
NO <sub>X</sub> <sup>2</sup>	6.65	g/hp-hr	9.8	2.5
SO <sub>2</sub> <sup>3</sup>	15	ppmw	2.7E-03	6.6E-04
VOC <sup>2</sup>	0.01	lb/hp-hr	6.7	1.7
PM <sup>2</sup>	0.021	g/hp-hr	3.1E-02	7.8E-03
PM10 <sup>2</sup>	0.021	g/hp-hr	3.1E-02	7.8E-03
PM <sub>2.5</sub> <sup>2</sup>	0.021	g/hp-hr	3.1E-02	7.8E-03
CO2	74.0	kg/MMBtu <sup>4</sup>	713	178
CH₄	3.0E-03	kg/MMBtu <sup>4</sup>	2.9E-02	7.2E-03
N <sub>2</sub> O	6.0E-04	kg/MMBtu <sup>4</sup>	5.8E-03	1.4E-03
COze			715	179

Notes:

<sup>1</sup> NSPS allows for only 100 hrs/yr of non-emergency operation of these engines. Potential emissions for the emergency generator are conservatively based on 500 hr/yr.

<sup>2</sup> Emission factors for Particulate Matter (TSP/PM<sub>10</sub>/PM<sub>2.5</sub>), Nitrous Oxide (NO<sub>x</sub>), 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.

<sup>3</sup> Sulfur content in accordance with Year 2013 standards of 40 CFR 80.510(a) as required by NSPS Subpart IIII.

<sup>44</sup>. Emission factors from Table C-1 and C-2 of 40 CFR Part 98 and Global Warming Potentials from Table A-1.

Pollutant	CAS No		Voc	Emission Eactor <sup>1</sup>	Potential	Emissions <sup>2</sup>
		He har	100	(lb/hp-hr)	(lb/hr)	(tpy)
Acetaldehyde	75-07-0	Y	Y	5.37E-06	3.6E-03	9.0E-04
Acrolein	107-02-8	Y	Y	6.48E-07	4.3E-04	1.1E-04
Benzene	71-43-2	Y	Ŷ	6.53E-06	4.4E-03	1.1E-03
Benzo(a)pyrene <sup>3</sup>	50-32-8	Y	Y	1.32E-09	8.8E-07	2.2E-07
1.3-Butadiene	106-99-0	Y	Y	2.74E-07	1.8E-04	4 6E-05
Formaldehyde	50-00-0	Y	Ŷ	8 26E-06	5 5E-03	1.4E-03
Naphthalene <sup>3</sup>	91-20-3	N	Y	5 94E-07	4 0E-04	1.0E-04
Total PAH (POM)		N	Ý	1.18F-06	7 9E-04	2.0E-04
Toluene	108-88-3	Y	Ŷ	2.86F-06	1.9E-03	4.8E-04
Xylene	1330-20-7	Ŷ	Ŷ	2.00E-06	1 3E-03	3 3E-04
	1	· · · ·	Total	AP Emissions	1.95-03	4.55-02
			Total	TAP EDISSIONS	1.00-02	4.52-03
u	1		Iotal	AP EMISSIONS	1./E-02	4.3E-03
Emission lactors obtained fr	on AP-42 Section	1 3.3 - Station	ary internal	Compustion Eng	ines, 10/96,	Table 3.3-2.
penzo(a)pyrene and naphtr		eu as mars in	iotal PAH.			
breviations:				1		
Btu - British thermal unit	I	MMBtu - Millio	n British the	mal units		
CAS - chemical abstract sen	vice	NO <sub>x</sub> - nitroge	n oxides			
CH <sub>4</sub> - methane		NC - North Ca	arolina	1		
CO - carbon monoxide		N <sub>2</sub> O - nitrous	oxide	ł		
COD		ODT avend	riad tana			
CO2 - carbon dioxide	J	ODI - Oven u	neu tons			
CO2 - carbon dioxide CO2e - carbon dioxide equiv	alent	PAH - polycyc	lic aromatic h	ydrocarbon		
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram	alent	PAH - polycyc PM - particula	lic aromatic h ite matter	ydrocarbon		
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon	valent	PAH - polycyc PM - particula PM <sub>10</sub> - particul	lic aromatic h ite matter late matter v	ydrocarbon l vith an aerodyna	amic diamete	r less than 10 micro
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutai	ralent     	PAH - polycyc PM - particula PM <sub>10</sub> - particu PM <sub>2.5</sub> - particu	lic aromatic h ite matter late matter v late matter v	ydrocarbon l vith an aerodyna with an aerodyn	amic diamete amic diamete	r less than 10 micro
CO2e - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutai hp - horsepower	valent       	PAH - polycyc PM - particula PM <sub>10</sub> - particu PM <sub>2.5</sub> - particu POM - polycyc	lic aromatic h ite matter late matter v llate matter v clic organic m	ydrocarbon l vith an aerodyna with an aerodyn atter	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or l
CO2e - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutai hp - horsepower hr - hour	alent         	PAH - polycyc PM - particula PM <sub>10</sub> - particul PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d	lic aromatic h ite matter late matter v llate matter v clic organic m ioxide	iydrocarbon l vith an aerodyna with an aerodyn atter	amic diamete amic diamete	r less than 10 microi
CO2e - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour ka - kilogram	alent I I I	PAH - polycyc PM - particula PM <sub>10</sub> - particul PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d	lic aromatic h ite matter late matter v ulate matter v clic organic m ioxide	ydrocarbon I with an aerodyna with an aerodyn atter	amic diamete amic diamete	r less than 10 microi
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilogram	alent I I I	$PAH - polycycPAH - porticulaPM - particulaPM_10 - particuPM_2.5 - particuPOM - polycycSO2 - sulfur dTAP - toxic air$	lic aromatic h lite matter late matter v llate matter v clic organic m ioxide r pollutant	ydrocarbon l vith an aerodyna with an aerodyn atter	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or le
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt b - pound	alent I I I	PAH - polycyc PM - particula PM <sub>10</sub> - particul PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons per VOC - volatile	lic aromatic h lite matter late matter v ulate matter v clic organic m ioxide pollutant r year	ydrocarbon l vith an aerodyna with an aerodyn atter l 	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or k
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt Ib - pound MW - megawatt	alent       	PAH - polycyc PAH - particula PM <sub>10</sub> - particula PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons pel VOC - volatile	lic aromatic h lic aromatic h late matter v llate matter v llate matter v lic organic m loxide r pollutant r year organic com	ydrocarbon Vith an aerodyna With an aerodyn atter Dound	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or le
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt lb - pound MW - megawatt	alent     	$\begin{array}{c} \text{OD1} = \text{Oven } \text{d} \\ \text{PAH} = \text{polycyc} \\ \text{PAH} = \text{particula} \\ \text{PM}_{10} = \text{particul} \\ \text{PM}_{10} = \text{particul} \\ \text{PM}_{2.5} = \text{particul} \\ \text{PM}_{2.5} = \text{particul} \\ \text{POM} = \text{polycys} \\ \text{SO}_2 = \text{sulfur } \text{d} \\ \text{TAP} = \text{toxic ain} \\ \text{toxic ain} \\ \text{toy} = \text{tons per} \\ \text{VOC} = \text{volatile} \\ \text{yr} = \text{year} \\ \end{array}$	lic aromatic h lic aromatic h tate matter late matter v late matter v lic organic m loxide pollutant r year organic com	ydrocarbon I with an aerodyna with an aerodyn atter I pound	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or le
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CO2e - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt Ib - pound MW - megawatt	alent I I I	PAH - polycyc PAH - particula PM <sub>10</sub> - particula PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons per VOC - volatile yr - year	lic aromatic h lic aromatic h tate matter late matter v llate matter v clic organic m loxide pollutant r year organic com	ydrocarbon I with an aerodyna with an aerodyn atter I pound	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or le
CO <sub>2</sub> e - carbon dioxide CO <sub>2</sub> e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutai hp - horsepower hr - hour kg - kilogram kW - kilowatt Ib - pound MW - megawatt	alent I I	PAH - polycyc PM - particula PM <sub>10</sub> - particul PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons per VOC - volatile yr - year	lic aromatic h lic aromatic h late matter late matter v llate matter v clic organic m loxide pollutant r year	ydrocarbon I with an aerodyna with an aerodyn atter I pound	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or la
CO2e - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt lb - pound MW - megawatt	alent nt	PAH - polycyc PM - particula PM <sub>10</sub> - particul PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons pel VOC - volatile yr - year	lic aromatic h lite matter late matter v clic organic m ioxide pollutant pollutant organic com	ydrocarbon i vith an aerodyn atter pound	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or la
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CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt Ib - pound MW - megawatt Conversions: 1 kW =	alent 	PAH - polycyc PAH - particula PM <sub>10</sub> - particula PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons pei VOC <u>-</u> volatile yr - year	lic aromatic h lic aromatic h late matter v late matter v late matter v lic organic m loxide r pollutant r year organic com	ydrocarbon I with an aerodyna with an aerodyn atter I pound	amic diamete	r less than 10 micro er of 2.5 microns or le
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt lb - pound MW - megawatt Conversions: 1 kW = 1 lb =	alent 	PAH - polycyc PAH - particula PM <sub>10</sub> - particula PM <sub>25</sub> - particu PM <sub>25</sub> - particu POM - polycys SO <sub>2</sub> - sulfur d TAP - toxic ain tpy - tons per VOC - volatile yr - year	lic aromatic h lic aromatic h late matter late matter v llate matter v clic organic m loxide pollutant r year organic com	ydrocarbon I with an aerodyna with an aerodyn atter I pound	amic diamete amic diamete	r less than 10 micro er of 2.5 microns or le
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CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt ib - pound MW - megawatt Conversions: 1 kW = 1 lb = 2.20462 40 CFR Part 98 - Table A-1 C	alent Int 1.34 453.59 pounds = 1 kg Global Warming P	PAH - polycyc PAH - porticula PM - particula PM <sub>10</sub> - particu PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons per VOC - volatile yr - year         	lic aromatic h lic aromatic h late matter v llate matter v llate matter v clic organic m loxide pollutant r year organic com	ydrocarbon i vith an aerodyna with an aerodyn atter i pound	amic diamete	r less than 10 micro er of 2.5 microns or le
CO2 - carbon dioxide CO2e - carbon dioxide equiv g - gram gal - gallon HAP - hazardous air pollutar hp - horsepower hr - hour kg - kilogram kW - kilowatt Ib - pound MW - megawatt Conversions: 1 kW = 1 lb = 2.20462 40 CFR Part 98 - Table A-1 C CO2	alent I 1.34 453.59 pounds = 1 kg Global Warming P	PAH - polycyc PAH - porticula PM - particula PM <sub>10</sub> - particu PM <sub>2.5</sub> - particu POM - polycyc SO <sub>2</sub> - sulfur d TAP - toxic air tpy - tons per VOC - volatile yr - year	lic aromatic h lic aromatic h late matter v llate matter v clic organic m ioxide pollutant r year	ydrocarbon i vith an aerodyn atter pound	amic diamete	r less than 10 micro er of 2.5 microns or k
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		Fire Pum	Potential Em	iscione			
		rite Punț	TEC_EWD	lissions			
		Envivo	ILS-FWF				
•		lamlet Richmo	nd County N	y LLC			
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Calculation Basis	1	_					
Engine Output	0,;				1		
Horsepower Rating	13	31 brake hp					
Diesel Density <sup>1</sup>	7	.1 lb/gai					
Hours of Operation	50	0 hr/yr					
Hourly Fuel Consumption		9 gal/hr <sup>1</sup>		1			
Energy Input	1.2	3 MMBtu/hr <sup>2</sup>					
	j						
ites:							
Diesel density from AP-42 5 footnote a. Energy calculated on a fuel	Section 3.4 - Lar I consumption ba	ge Stationary E asis, using an e	nergy factor o	f 0.137 MMBtu	ı/gal.	10/90	
Diesel density from AP-42 S footnote a. Energy calculated on a fue Potential Criteria Pollutar	Section 3.4 - Lar	ge Stationary E	nergy factor o	f 0.137 MMBtu	i/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fue Potential Criteria Pollutar Pollutant	Section 3.4 - Lar	ge Stationary E asis, using an e Units	nergy factor o Potential E (lb/hr)	f 0.137 MMBtu missions <sup>1</sup> (tpy)	i/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fue Potential Criteria Pollutar Pollutant	Section 3.4 - Lar	ge Stationary D asis, using an e Units g/kW-hr	Potential E (Ib/hr) 0.28	f 0.137 MMBtu =	i/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NO <sub>X</sub> <sup>2</sup>	Section 3.4 - Lar consumption bi t Emissions Emission Factor 1.3 3.4	ge Stationary D asis, using an e Units g/kW-hr	Potential E (Ib/hr) 0.28 0.72	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18	/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel <b>Potential Criteria Pollutar</b> Pollutant CO <sup>2</sup> NO <sub>X</sub> <sup>2</sup> SO <sub>2</sub> <sup>3</sup>	Section 3.4 - Lar	ge Stationary D asis, using an e Units g/kW-hr g/kW-hr ppmw	Potential E (1b/hr) 0.28 0.72 1.9E-03	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04	i/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NO <sub>x</sub> <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup>	Section 3.4 - Lar	ge Stationary D asis, using an e Units g/kW-hr g/kW-hr ppmw g/kW-hr	Potential E (lb/hr) 0.28 0.72 1.9E-03 3.2E-02	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03	/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NO <sub>x</sub> <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup>	Section 3.4 - Lar consumption bi Emissions Factor 1.3 3.4 15 0.15 0.17	ge Stationary D asis, using an e Units g/kW-hr g/kW-hr ppmw g/kW-hr g/kW-hr	Potential E (lb/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03	/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NO <sub>x</sub> <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup> PM <sub>10</sub> <sup>2</sup>	Section 3.4 - Lar consumption bi t Emissions Factor 1.3 3.4 15 0.15 0.17 0.17	ge Stationary D asis, using an e Units g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr	Potential E (Ib/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02 3.7E-02	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03 9.2E-03	/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fue Potential Criteria Pollutar Pollutant CO <sup>2</sup> NO <sub>x</sub> <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup> PM <sub>10</sub> <sup>2</sup> PM <sub>2.5</sub> <sup>2</sup>	Section 3.4 - Lar consumption bi Emissions Factor 1.3 3.4 15 0.15 0.17 0.17 0.17	ge Stationary D asis, using an e g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr	Potential E (Ib/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02 3.7E-02 3.7E-02 3.7E-02	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03 9.2E-03 9.2E-03	i/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NOx <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup> PM <sub>10</sub> <sup>2</sup> PM <sub>2.5</sub> <sup>2</sup> CO <sub>2</sub>	Section 3.4 - Lar consumption bi <b>Emissions</b> <b>Emission</b> <b>Factor</b> 1.3 3.4 15 0.15 0.17 0.17 0.17 0.17 74	ge Stationary D asis, using an e g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr	Potential E (1b/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02 3.7E-02 3.7E-02 201	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03 9.2E-03 9.2E-03 50	i/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NOx <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup> PM <sub>10</sub> <sup>2</sup> PM <sub>2.5</sub> <sup>2</sup> CO <sub>2</sub> CH <sub>4</sub>	Section 3.4 - Lar consumption bi t Emission Factor 1.3 3.4 1.5 0.15 0.17 0.17 0.17 0.17 74 3.0E-03	ge Stationary D asis, using an e g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr kg/MMBtu <sup>4</sup>	Potential E (1b/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02 3.7E-02 3.7E-02 2.01 8.2E-03	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03 9.2E-03 9.2E-03 50 2.0E-03	/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NOx <sup>2</sup> SO2 <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup> PM <sub>10</sub> <sup>2</sup> PM <sub>2.5</sub> <sup>2</sup> CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> O	Section 3.4 - Lar consumption bi- it Emission Factor 1.3 3.4 1.5 0.15 0.17 0.17 0.17 0.17 74 3.0E-03 6.0E-04	ge Stationary D asis, using an e g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr kg/MMBtu <sup>4</sup> kg/MMBtu <sup>4</sup>	Potential E (1b/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02 3.7E-02 3.7E-02 201 8.2E-03 1.6E-03	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03 9.2E-03 9.2E-03 50 2.0E-03 4.1E-04	/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel <b>Potential Criteria Pollutar</b> <b>Pollutant</b> CO <sup>2</sup> NO <sub>X</sub> <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup> PM <sub>10</sub> <sup>2</sup> PM <sub>2.5</sub> <sup>2</sup> CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> O CO <sub>2</sub> e	Section 3.4 - Lar consumption bi- it Emission Factor 1.3 3.4 1.5 0.15 0.17 0.17 0.17 0.17 74 3.0E-03 6.0E-04	ge Stationary D asis, using an e g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr kg/MMBtu <sup>4</sup> kg/MMBtu <sup>4</sup>	Potential E (1b/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02 3.7E-02 3.7E-02 201 8.2E-03 1.6E-03 202	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03 9.2E-03 9.2E-03 50 2.0E-03 4.1E-04 50	/gal.		
Diesel density from AP-42 S footnote a. Energy calculated on a fuel Potential Criteria Pollutar Pollutant CO <sup>2</sup> NOx <sup>2</sup> SO <sub>2</sub> <sup>3</sup> VOC <sup>2</sup> PM <sup>2</sup> PM <sub>10</sub> <sup>2</sup> PM <sub>2.5</sub> <sup>2</sup> CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> O CO <sub>2</sub> e tes:	Section 3.4 - Lar consumption bi Emissions Factor 1.3 3.4 15 0.15 0.17 0.17 0.17 0.17 74 3.0E-03 6.0E-04	ge Stationary D asis, using an e g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr g/kW-hr kg/MMBtu <sup>4</sup> kg/MMBtu <sup>4</sup>	Potential E (Ib/hr) 0.28 0.72 1.9E-03 3.2E-02 3.7E-02 3.7E-02 3.7E-02 3.7E-02 201 8.2E-03 1.6E-03 202	f 0.137 MMBtu missions <sup>1</sup> (tpy) 7.0E-02 0.18 4.8E-04 8.1E-03 9.2E-03 9.2E-03 9.2E-03 50 2.0E-03 4.1E-04 50	/gal.		

<sup>73</sup> Sulfur content in accordance with Year 2013 standards of 40 CFR 80.510(a) as required by NSPS Subpart IIII.
 <sup>74</sup> Emission factors from Table C-1 and C-2 of 40 CFR Part 98 and Global Warming Potentials from Table A-1.

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Pollutant	CAS No.	NC TAP	voc	Emission Factor <sup>1</sup>	Potential	Emissions <sup>2</sup>
				(lb/hp-hr)	(lb/hr)	(tpy)
Acetaldehyde	75-07-0	Y	Y	5.4E-06	7.0E-04	1.8E-04
Acrolein	107-02-8	Y	Y	6.5E-07	8.5E-05	2.1E-05
Benzene	71-43-2	Y	Y	6.5E-06	8.6E-04	2.1E-04
Benzo(a)pyrene	50-32-8	Y	Y	1.3E-09	1.7E-07	4.3E-08
1,3-Butadiene	106-99-0	Y	Y	2.7E-07	3.6E-05	9.0E-06
ormaldehyde	50-00-0	Y	Y	8.3E-06	1.1E-03	2.7E-04
laphthalene	91-20-3	N	Y	5.9E-07	7.8E-05	1.9E-05
fotal PAH (POM) <sup>3</sup>		N	Y	1.2E-06	1 5E-04	3 9E-05
Toluene	108-88-3	Y	Y	2 9E-06	3.8E-04	0.4E-05
(vlene	1330-20-7	Ý I	Ý	2.05-06	2.65-04	6.55-05
			Total H	AD Emissione	2.01-04	0.5E-03
			Total T	AP Emissions	3.02-03	8.92-04
			lotal I.	AP Emissions	3.4E-03	8.5E-04
	.a					
ISPS allows for only 100 hrs	/yr of non-emen	s, 10/96, Tabl	le 3.3-2.	noines. Potentia	al emissions	for the fire nump ar
onservatively based on 500 he PAH emission factor inclu lso calculated separately. Finduded separately to avoid	hr/yr. Ides all the PAH or the purposes double counting	compounds li of calculating these emissi	isted in AP-42. total HAP emi ions.	Emissions for ssions, the nap	naphthalene ohthalene an	and benzo(a)pyrer d benzo(a)pyrene a
roviatione		`]				
Rtu - Britich thermal unit	-, -,	MMDELL MILLE	n Duitinh the			
co british chemia unic		MIMBLU - MINIC	on prush them	nai units	1	
AS - chemical abstract convi	69	MO - nitrogo	n evidee	1		í í
AS - chemical abstract servi	ce	NO <sub>x</sub> - nitroge	n oxides			
AS - chemical abstract servi H <sub>4</sub> - methane	ce	NO <sub>x</sub> - nitroge NC - North C	n oxides arolina			· · · · · · · · · · · · · · · · · · ·
AS - chemical abstract servi CH <sub>4</sub> - methane	ce.	NO <sub>x</sub> - nitroge NC - North C N <sub>2</sub> O - nitrous	n oxides arolina oxide			
AS - chemical abstract servi H <sub>4</sub> - methane O - carbon monoxide O2 - carbon dioxide	ce	NO <sub>x</sub> - nitroge NC - North C N <sub>2</sub> O - nitrous ODT - oven d	n oxides arolina oxide Iried tons			
AS - chemical abstract servi H <sub>4</sub> - methane O - carbon monoxide O2 - carbon dioxide O2e - carbon dioxide equiva	ce lent	NO <sub>x</sub> - nitroge NC - North C N <sub>2</sub> O - nitrous ODT - oven d PAH - polycyc	n oxides arolina oxide Iried tons dic aromatic hy	drocarbon		
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	IES-CHI	P-1		
	Enviva Pellets H	amlet. LLC		
Hamlet	Richmond Cour	ty. North Car	olina	
Calculation Basis		+-		
	275	ton/hr, wet		
Hourly Throughput*	138	ODT/hr		
Annual Throughput	625,011	ODT/yr		
Potential Criteria Pollutant En	nissions			
Pollutant	Emissio	on Factor	Potential	Emissions
			(lb/hr)	(tpy)
THC as carbon <sup>2</sup>	4.1E-03	lb/ODT	0.56	1.3
VOC as propane <sup>3</sup>	5.0E-03	lb/ODT	0.69	1.6
Methanol <sup>2</sup>	1.0E-03	lb/ODT	0.14	0.31
Hourly chipper throughput data 12/21/17).	provided by Env	/iva (email froi	n Kai Simonse	n dated
Emission factor obtained from a 10.6.3, Medium Density Fiberbo Fiberboard, 10/02, Table 9. Em all three tables.	ard, 08/02, Tabl ission factors for	ns factors for o e 7 and Sectio <sup>-</sup> THC and met	chippers in AP n 10.6.4, Harc hanol are the	-42 Section Iboard and same acro
Emission factor obtained from a 10.6.3, Medium Density Fiberbo Fiberboard, 10/02, Table 9. Em all three tables. Emission factor for VOC as prop Fiberboard, 08/02, Table 7.	vailable emissio ard, 08/02, Tabl ission factors for ane is from AP-4	ns factors for o e 7 and Sectio r THC and met 2, Section 10.	chippers in AP n 10.6.4, Hard hanol are the 6.3., Medium	-42 Section Iboard and same acro Density
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Emission factor obtained from a 10.6.3, Medium Density Fiberbo Fiberboard, 10/02, Table 9. Em all three tables. Emission factor for VOC as prop Fiberboard, 08/02, Table 7. <b>breviations:</b> hr - hour Ib - pound ODT - oven dried tons	vailable emissio ard, 08/02, Tabl ission factors for ane is from AP-4	ns factors for o e 7 and Sectio THC and met 2, Section 10.	chippers in AP n 10.6.4, Hard hanol are the 6.3., Medium	-42 Section dboard and same acro Density
Emission factor obtained from a 10.6.3, Medium Density Fiberbo Fiberboard, 10/02, Table 9. Em all three tables. Emission factor for VOC as prop Fiberboard, 08/02, Table 7. <b>breviations:</b> hr - hour lb - pound ODT - oven dried tons THC - total hydrocarbon	vailable emissio ard, 08/02, Tabl ission factors for ane is from AP-4	ns factors for o e 7 and Sectio THC and met 2, Section 10.	chippers in AP n 10.6.4, Hard hanol are the 6.3., Medium	-42 Section dboard and same acro Density
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		Table 12		
	Bark Hog	Potential Emissi	ons	
	IES	S-BARKHOG		
	Enviva P	ellets Hamlet, Ll	_C	
Haml	et, Richmor	nd County, North	Carolina	
Calculation Basis				
Hoursy Throughput <sup>1</sup>	50	ton/hr, wet		
Houriy Throughput	25	ODT/hr		
Appual Throughout <sup>2</sup>	113,638	ODT/yr		
Annual Inroughput	227,277	ton/yr, wet		
Approx. Moisture Content <sup>1</sup>	50%	of total weight		
Potential Criteria Pollutant	Emissions	-		
Pollutant	Emico	ion Factor	Potential E	missions <sup>1</sup>
	Emiss		(lb/hr)	(tpy)
THC as carbon <sup>3</sup>	4.1E-03	lb/ODT	0.10	0.23
VOC as propane <sup>4</sup>	5.0E-03	lb/ODT	0.13	0.28
Methanol <sup>3</sup>	1.0E-03	lb/ODT	2.5E-02	5.7E-02
TSP <sup>5</sup>	2.0E-02	lb/ton	0.10	0.23
PM <sub>10</sub> <sup>5</sup>	1.1E-02	lb/ton	5.5E-02	0.13

#### Notes:

<sup>1.</sup> Hourly bark hog throughput data and approximate moisture content provided by Enviva (email from Kai Simonsen dated 12/21/17).

<sup>2.</sup> Maximum throughput assumes bark hog usage is proportional to the amount of log chipping that occurs for maximum pellet ODT and maximum 75% purchase of green wood from logs.

\*3. 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.

<sup>4</sup> Emission factor for VOC as propane is from AP-42, Section 10.6.3., Medium Density Fiberboard, 08/02, Table 7.

<sup>5.</sup> 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: Image: Constraint of the second se

_				eldbr	1.3									
			Gr	een Wood	Handling									
1				IES-G	WН									
+			Enviv	a Pellets I	lamlet, LL	<u>C</u>								~
-		Ha	mlet, Rich	mond Cou	nty, North	Carolina								
Source	Transfer Activity <sup>3</sup>	Number of Drop	Material Moisture Content <sup>2</sup>	PM Emission Factor <sup>3</sup>	PM <sub>10</sub> Emission Factor <sup>3</sup>	PM <sub>2.5</sub> Emission Factor <sup>3</sup>	Po' Thro	tential ughput <sup>4</sup>	Poten Emiss	tial PM sions <sup>5</sup>	Potenti Emis	iai PM <sub>10</sub> slons <sup>5</sup>	Potenti Emis	al PM <sub>2.5</sub> sions <sup>5</sup>
		PVIILS	(%)	(lb/ton)	(lb/ton)	(lb/ton)	(tph)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
	Purchased Bark/Fuel Chips Transfer to Outdoor Storage Area	1	48%	5.0E-05	2.4E-05	3.6E-06	25	81,640	1.2E-03	2.0E-03	5.9E-04	9.6E-04	8.9E-05	1.5E-0
EC CHUI	Purchased Wood Chips to Outdoor Storage Area	4	42%	6.0E-05	2.8E-05	4.3E-06	69	312,505	1.6E-02	3.7E-02	7.8E-03	1.8E-02	1.2E-03	2.7E-0
ES*GWR	Processed Wood Chips to Outdoor Storage Area	2	42%	6.0E-05	2.8E-05	4.3E-06	138	312,505	1.6E-02	1.9E-02	7.8E-03	8.9E-03	1.2E-03	1.3E-0
· · · · · · ·	Chip Truck Dump to Dumpers	2	42%	6.0E-05	2.8E-05	4.3E-06	69	312,505	8.2E-03	1.9E-02	3.9E-03	8.9E-03	5.9E-04	1.3E-0
							Total E	missions:	4.2E-02	7.7E-02	2.0E-02	3.6E-02	3.0E-03	5.5E-0
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otes: These gro Average r on July 12	en wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 2, 2017. Assumed the lower moisture content between pine a	e emissior by design nd hardw	is at the si engineerir ood to con	te. ng firm (Mid servatively	-South Eng	gineering). M emissio	Molstu	ire conten irdwood 4	t for purch 2% moistu	ased and	process w	vood chips	provided	by Enviv
Average i on July 12 (processe Emission	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 2, 2017. Assumed the lower moisture content between pine ar d wood chips). factor calculation based on formula from AP-42, Section 13.2.4	e emissior by design nd hardw - Aggrega	is at the si engineerir ood to con ate Handlin	te. ng firm (Mid servatively ng and Stor	-South Eng estimate F age Piles,	gineering). PM emission Equation 1	Molstu ns. (Ha 3.2.1, (	re conten rdwood 4 11/06).	t for purch 2% moisti	ased and ure; pine 5	process w 51% (purch	vood chips nased woo	provided od chips) a	by Enviv nd 49%
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otes: These gra Average ( on July 1: (processe Emission where:	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided   2, 2017. Assumed the lower moisture content between pine a d wood chips). factor calculation based on formula from AP-42, Section 13.2.4 (E = emission factor (Ib/ton) & e particle size multiplier (dimensionless) for PM	e emissior by design nd hardw - Aggrega 0.74	is at the si engineerir ood to con ate Handlin	te. ng firm (Mid servatively ng and Stor	-South Eng estimate P age Piles,	gineering). PM emission Equation 1	Molstuns. (Ha	rre conten rdwood 4 11/06).	t for purch 2% moisti	ased and ire; pine 5	process w 51% (purc	rood chips nased woo	provided od chips) a	by Enviv nd 49%
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otes: These gri Average i on July 1: (processe Emission where: Throughp wood chip	en wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 1 2, 2017. Assumed the lower moisture content between pine and wood chips). factor calculation based on formula from AP-42, Section 13.2.4 (E = emission factor (Ib/ton) k = particle size multiplier (dimensionless) for PM (k = particle size multiplier (dimensionless) for PM <sub>20</sub> (k = particle size multiplier (dimensionless) for PM <sub>25</sub> U = mean wind speed (mph) uts represent dry weight of materials, calculated based on list throughput based on weight of materials	e emission by design nd hardw - Aggrega 0.74 0.35 0.053 7.85 ed materi Hourly pr	is at the si engineeri ood to con ate Handiin ate Handiin al moisture ocessed w	te. ng firm (Mid servatively ig and Stor g and Stor contents. ood chip th	-South Eng estimate F age Piles, Hourly pur	pineering). PM emission Equation 1 Equation 1 based bai	Molstuns. (Ha	ire conten rdwood 4 11/06). Ighput ba: ping hourt	t for purch 2% moistu sed on baa y through	rk hog hou	process w 51% (purch	vood chips nased woo	provided od chips) a	by Enviv nd 49%
otes: These gr Average i on July 1: (processe Emission where : Throughp wood chir	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 2, 2017. Assumed the lower moisture content between pine and wood chips). factor calculation based on formula from AP-42, Section 13.2.4 (E = emission factor (lb/ton) k = particle size multiplier (dimensionless) for PM k = particle size multiplier (dimensionless) for PM <sub>2.5</sub> U = mean wind speed (mph) uts represent dry weight of materials, calculated based on lists throughput based on weight of chips delivered to the facility.	e emissior by design nd hardw - Aggrega 0.74 0.35 0.053 7.85 ed materi Hourly pr	is at the si engineerin ood to con ste Handilin at moisture rocessed w	e. g firm (Mid servatively g and Stor g and Stor contents. ood chip t	-South Eng estimate F age Piles, Hourly pur roughput	gineering). PM emission Equation 1 chased ba based on I	Molstuns. (Ha 3.2.1, ( rk throu og chip	re conten rdwood 4 11/06). Ighput ba: ping hour	t for purch 2% moistu sed on ba y through	rk hog hou out.	process w 51% (purch	rood chips nased woo	provided od chips) a rly purcha	by Enviv nd 49%
otes: These gr Average : on July 1: (processe Emission where : Throughp wood chip breviatio br - hour	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 2, 2017. Assumed the lower moisture content between pine a d wood chips). factor calculation based on formula from AP-42, Section 13.2.4 E emission factor (Ib/ton) & te particle size multiplier (dimensionless) for PM k = particle size multiplier (dimensionless) for PM <sub>2.5</sub> U = mean wind speed (mph) u = mean wind speed (mph) u is represent dry weight of materials, calculated based on lists b throughput based on weight of chips delivered to the facility. <b>PEL</b>	e emissior by design nd hardw - Aggrega 0.74 0.35 0.053 7.85 ed materi Hourly pr	is at the si engineerir ood to con ste Handlin at Handlin al moisture occessed w	re. ng firm (Mid servatively ig and Stor g and Stor contents. cod chip th	-South En estimate F age Piles, Hourly pur rroughput	gineering), PM emission Equation 1 Chased ban based on I	Molstuns. (Ha 3.2.1, ( rk throu og chip	re conten rdwood 4 11/06). Ighput baa ping hourt	t for purch 2% moistu sed on ba y through	rk hog hou	process w 51% (purch	nood chips nased woo	provided d chips) a	by Enviv nd 49%
otes: These gr Average ion July 1: (processe Emission where: Throughp wood chir breviation hr - hour; b - pounc	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 1 2, 2017. Assumed the lower moisture content between pine at wood chips). factor calculation based on formula from AP-42, Section 13.2.4 E = emission factor (Ib/ton) k = particle size multiplier (dimensionless) for PM k = particle size multiplier (dimensionless) for PM <sub>2.5</sub> U = mean wind speed (mph) us represent dry weight of materials, calculated based on list o throughput based on weight of chips delivered to the facility <b>Pst</b>	e emissior by design nd hardw - Aggrega 0.74 0.35 0.053 7.85 ed materi Hourly pr	is at the si engineerir ood to con ate Handiln ate Handiln al moisture ocessed w	te. Ing firm (Mid servatively g and Stor g and Stor contents. cod chip t	-South En estimate f age Piles, Hourly pur roughput	glneering). M emissio Equation 1 chased bai based on li	Molstuns. (Ha	re conten rdwood 4 11/06). Ighput baa ping hourt	t for purch 2% moistu sed on ba y through	rk hog hou	process w 51% (purch	nood chips nased woo	provided d chips) a l	by Enviv nd 49%
otes: These gr Average ion July 1: (processe Emission where: Throughp wood chip breviatio hr - houri b - pounc PM - parti	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 2, 2017. Assumed the lower moisture content between pine a d wood chips). factor calculation based on formula from AP-42, Section 13.2.4 (E = emission factor (Ib/ton) k = particle size multiplier (dimensionless) for PM <sub>10</sub> (k = particle size multiplier (dimensionless) for PM <sub>25</sub> U = mean wind speed (mph) uts represent dry weight of materials, calculated based on lists throughput based on weight of chips delivered to the facility. <b>PEL</b>	e emissior by design nd hardw - Aggrega 0.74 0.35 0.053 7.85 ed materi Hourly pr	is at the si engineerir ood to con ate Handiin al moisture ocessed w	re. Ing firm (Mid servatively g and Stor and Stor contents. ood chip th	-South Eng estimate f age Piles, Hourly pur roughput	gIneering). M emission Equation 1 chased ba based on I	Molstuns. (Ha	re conten rdwood 4 11/06). ghput bar ping hourt	t for purch 2% moistu sed on ba y through	rk hog hou	process w 51% (purch unity throug	hput. Hou	provided d chips) a rly purcha	by Enviv nd 49%
otes: These gr Average ion July 1. (processe Emission where: Emission where: Throughp wood chip breviatio hr - hour b - pounc PM - parti PM - parti	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 2, 2017. Assumed the lower moisture content between pine at d wood chips). factor calculation based on formula from AP-42, Section 13.2.4 E = emission factor (Ib/ton) & te particle size multiplier (dimensionless) for PM & particle size multiplier (dimensionless) for PM <sub>2.5</sub> U = mean wind speed (mph) uis represent dry weight of chips delivered to the facility. Dust represent dry weight of chips delivered to the facility. <b>PSI</b> Culate matter with an aerodynamic diameter less than 10 mic fuelate matter with an aerodynamic diameter less than 10 mic	e emissior by design nd hardw - Aggrega 0.74 0.35 0.053 7.85 ed materi Hourly pr	is at the si engineerir ood to com ate Handlin al moisture occessed w	te. Ig firm (Mid servatively g and Stor contents. ood chip t	-South Eng estimate F age Piles, Hourly pur roughput	plneering). M emissio Equation 1 Equation 1 chased bab based on I	Molstuns. (Ha 3.2.1, ( rk throu og chip	re conten rdwood 4 11/06). Ighput bar ping hourt	t for purch 2% moistu sed on ba y through	rk hog hou	process w 51% (purch	hput. Hou	provided d chips) a	by Enviv nd 49%
otes: These gr Average 1. (processe Emission where: Throughp wood chip breviatio pr - hour; b - pounc PM - parti PM - parti PM - parti	een wood handling emissions are representative of the fugitive moisture content for bark based on material balance provided 2, 2017. Assumed the lower moisture content between pine at d wood chips). factor calculation based on formula from AP-42, Section 13.2.4 (E = emission factor (Ib/ton) k = particle size multiplier (dimensionless) for PM k = particle size multiplier (dimensionless) for PM <sub>2.5</sub> U = mean wind speed (mph) uts represent dry weight of materials, calculated based on list b throughput based on weight of chips delivered to the facility. <b>Pst</b> culate matter ticulate matter with an aerodynamic diameter less than 10 mic rticulate matter with an aerodynamic diameter of 2.5 microns of	e emission by design and hardw - Aggrega 0.74 0.35 0.053 7.85 ed materi Hourly pr	is at the si engineerir ood to con- ate Handlin ate Handlin al moisture occessed w	te. ig firm (Mid servatively g and Stor contents. ood chip th	-South Eng estimate i age Piles, Hourly pur rroughput	plneering), Memission Equation 1 chased ban based on h	Molstuns. (Ha 3.2.1, ( rk throu og chip	ire conten rdwood 4 11/06). Ighput baa ping hourf	t for purch 2% moist 2% moist sed on ba y through	rk hog hou	process w \$1% (purch undy throug	nood chips nased woo	provided d chips) a	by Enviv nd 49%

						Table	14										
					Storage	e Pile W	Ind Erosi	on									
1			-	IES-GV	VSP-1 throu	igh -4, s	and TES-E	FSP-1	and -2						-		
		-			Enviva	Pellets I	Hemlet, L	LC					• •				
				Har	niet, Richm	ond Cou	nty, Nort	h Caroli	ina								
			-	1	1	1	1		1	1	i					1	
Source	Description	PM Emission i	l Factor <sup>1</sup>	VOC Emissio	n Factor <sup>2</sup>	Pile Width	Pile Length	Pile Height	Outer Surface Area of Pile <sup>3</sup>	Poten Emil	tial PM Isions	Poteni	tial PM <sub>10</sub> ssions	Potenti Emis	ial PM <sub>2.5</sub> Islons	Potent Emiss	tial VOC tions as
		(Ib/day/acre)	(lb/hr/ft²)	(lb/day/acre)	(lb/hr/ft2)	(ft)	(ft)	(ft)	(ft <sup>2</sup> )	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(ib/hr)	(tpy
IES-GWSP-1	Green Wood Storage Pile No. 1	8.6	8.2E-06	3.6	3.4E-06	100	310	30	66,720	0.55	2.4	0.27	1.2	0.041	0.18	0.28	1.2
IES-GWSP-2	Green Wood Storage Pile No. 2	8.6	8.2E-06	3.6	3.4E-06	100	310	30	66,720	0.55	2.4	0.27	1.2	0.041	0.18	0.28	1.2
IES-GWSP-3	Green Wood Storage Pile No. 3	8.6	8.2E-06	3.6	3.4E-06	220	310	30	120,000	0.99	4.3	0.49	2.2	0.074	0.32	0.50	2.2
IES-GWSP-4	Green Wood Storage Pile No. 4	8.6	8.2E-06	3.6	3.4E-06	220	310	30	120,000	0.99	4.3	0.49	2.2	0.074	0.32	0.50	2.2
IES-BFSP-1	Bark Fuel Storage Pile No. 1	8.6	8.2E-06	3.6	3.4E-06	60	100	15	12,960	0.11	0.47	0.053	0.73	8.0E-03	0.035	0.054	0.24
IES-BFSP-2	Bark Fuel Storage Pile No. 2	8.6	8.2E-06	3.6	3.4E-06	25	25	15	2,550	0.021	0.092	0.010	0.046	1 6E-03	6 9E-02	0.011	0.04
								To	tal Emissions:	3.2	14	16	2.0	0.24	1.1	1.6	7.2
				1		-				UIL		1.0	7.0	0.24	1	1.0	1.4
tes:				1					1		· · · · · ·	1			+		
TSP emicelon	factor based on U.S. EPA Control	of Open Euclide	Duch Courses	Descent Trice	ala Davis Ala						ł	1		1	1	-	
ior emission	lactor based on 0.3. EPA control	of Open Fugicive	Dust Sources	. Research Irian	igie Park, No	rtn Care	ina, EPA	450/3-	88-008. Septer	nber 198	8, Page 4	-17.					
E=1.7	365-p) ( f (Ib/day/acre)			·	1							+					
(1.5)	235 人15/				1							·		1	l		
where	r silt option of	wood chine (%)		n , nilt contont fi	N. J. Kom Jumpha		1				1	L	1				· · ·
n	umber of days with rainfall greate	r than 0.01 inch:	110	Based on AD-47	Eaction 12	2.2.114	ns (mean	J HOMA	105 Section 12	3.2.2 - 01	ipaved R	0805, 11/4	, 12D/8	13.2.2-1	ļ		
	f (time that wind exceeds 5.36 m	/s - 17 mnh) (%):	12.5	Based on meteo	rological dat	2.2 - 01	and for 2	013 301	/06, Figure 13.	(.1~2. IC Nabia -	1 Marsh	-	()				1
		1	1	PM-+ is assumed	to equal 50	0% of TC	D baced a	012-201	EBA Control of	AC Mation	al weach	Er Service	(NWS) SI	Trianala D	) A sele bis sele	Constant lines	504
	I	PM <sub>10</sub> /TSP ratio:	50%	450/3-88-008.	September 1	988.	r Daseu i	/1 0.5.1	EPA CONTINUO	open rug	icive pust	sources,	research	i riangie P	ark, North	Carolina,	, CPA-
	1		7 50	PM2.5 Is assumed	to equal 7.	5 % of T	SP U.S. E	PA Back	around Docum	ent for Re	visions to	Fine Fran	tion Ratio	s Used for	AP-47 Fu	nitive Dus	
	L	1 FM2.5/13P 1800:	7.5%	Emission Factors	s. November	2006.			-								
Emission fact Emission fact	ors obtained from NCASI documen ors ranged from 1.6 to 3.6 lb C/ac	it provided by the re-day. Enviva d	South Carol	ina Department of by the maximum of	of Health and emission fac	Enviroi	nmental C urposes d	Control ( of conse	(DHEC) for the c rvatism.	ziculation	n of fugitiv	ve VOC em	nissions fr	om Dougla	s Fir woo	d storage	piles.
The surface a	rea is calculated as [2*H*L+2*W*	*H+L*W] + 20%	to consider ti	he sloping pile ed	ges, Length	and wi	dth base	d on pro	posed site des	ign with a	conserv	ative heig	ht,	1			1
Emissions are	calculated in tons of carbon per y	year by the follow	ing formula:	s	1	1	1 2				1	T	i	1			1
	tons C/year = 5 acres * 365 days	s * 1.6 lb C/acre-	day / 2000 lb	/ton	ł			1				Ĭ	1	1	1		1
Emission fact	or converted from as carbon to as	propane by mult	iplying by 1.2	2.					1		1		1				
And the state of the second								. 4			£	ł	1 = = .	1	1		
EPA - Environ	mental Protection Agency			PM - particulate	matter						·						ł
ft - feet	i i i i i i i i i i i i i i i i i i i			PM <sub>10</sub> - particulate	e matter with	anaer	odvoamic	diamet	er less than 10	micmas	1	+		r -		· _ ·	
ft <sup>2</sup> - square fe	et			PM <sub>2 s</sub> - particulat	e matter wit	hanae	rodynami	c diamet	ter of 2.5 micro	ns or less		+					
lb - pound				tpy - tons per ye	ar		1	1		no or ieao	1	-	<u>}</u>				
mph - miles p	er hour			TSP - total suspe	ended partic	ulate	Ī					1		1			1 -
NCASI - Natio	nal Council for Air and Stream Imp	myement Inc		yr - year	annie comon	und							<u>}</u>				
NWS - Nation	al Weather Service	i annuncy and			Aerise colubo	ono i					1				· · · ·		
		1			1		1				4	1	1	1			†
																	1
oversions																	1
43,560	ft <sup>2</sup> = 1 acre																1
	br = 1 day																
29	111 = 1 GGA															1	1

1						Table 1	5										
				Potential	Fugitive	PM Emissi	ons from	Paved Ro	abso								
					Enviva	Pellets Ha	amiet, LLC										
				Ham	det, Richn	ond Count	ty, North	Carolina									
Vehicle Activity	Distance Traveled per Roundtrip <sup>1</sup>	Trips Per Day <sup>2</sup>	Daily VMT	Events Per Year	Empty Truck Weight	Loaded Truck Weight	Average Truck Weight	Annua) VMT	PM Emission Factor <sup>3</sup>	PM <sub>10</sub> Emission Factor <sup>3</sup>	PM <sub>2.5</sub> Emission Factor <sup>3</sup>	Poten Emis	tial PM sions	Potenti Emis	al PM <sub>10</sub> sions	Potenti Emis	al PM <sub>2.5</sub> sions
Logs Delivery to Crane Storage Area	9.000	47	80	365	40.480	102.540	35.8	29 741	2.7	0.53	0.12	21	2.0	(10/039)	(tpy)	(10/04)	(tpy)
Logs Delivery to South Log Storage Area	11,700	31	69	365	40,480	102 540	75.0	25,241	2.7	0.33	0.13		3.9	4.2	0.70	1.0	0.19
Lags Delivery to North Log Storage Area	8 475	14	72	265	40,400	102,540	35.0	8 361	2.7	0.55	0.13	10	3.3	3.0	0.67	0,89	0.16
Chips (Hag Fuel Dativan)	8.475	04	1.74	305	40,400	102,340	33.0	105,0	2.1	0.55	0.13	6.0	1.1	1.2	0.22	0.29	5.4E-0
Ballet Truck Delivers to Ballet Landout Area (Truck Back up)	0,475	34	100	305	40,960	101,440	35.6	55,071	2.6	0.53	0,13	40	7.3	8.0	1.5	2.0	0.36
Pellet Truck Delivery to Pellet Loadout Area (Hock Back-up)	9,075	80	103	10	40,480	102,540	35.8	1,031	2.7	0.53	0.13	27	0.14	5.5	2.7E-02	1.3	6.7E-0
Fellet Huck Delivery to Pellet Loadout Area (Normal Operations)	900	2	0.34	300	40,480	102,540	35.8	102	2.7	0.53	0.13	9.0E-02	1.4E-02	1.8E-02	2.7E-03	4.4E-03	6.7E-04
employee car Panding	2,250	75	3Z	365	4.000	4 000	2.0	11,665	0.14	0.028	6.9E-03	0.45	8.2E-02	8.9E-02	1.6E-02	2.2E-02	4.0E-03
		1			_	_				Total	Emissions:	113	16	23	3.2	5.6	0.78
obes: Distance traveled per round frip was estimated based on truck ro Dally the counts based on ordinal nermit application estimation	ute and site	layout		_		-			-						1		
Emission factors calculated based on Equation 2 from AP-42 Section where	lon 13.2.1 - P	aved R	loads, C	1/11.				_		_			-	-			1
1	F=	emissi	on facto	r. or (lb/ton)												-	j
k = particle s	ize multiolier	Idime	nsignle	sst for PM	0.011												
k = particle siz k = particle size	e multiplier ( e multiplier (	dimens	sionless	for PM10	0.0022	. =				-		_					<u>-</u>
sL - mean road surface silt loading from AP-	42 Table 13.2	.1-3 fo	rouarr	les (g/m <sup>2</sup> )	8.2					-	-				1		-
P - No, days	with rainfall	greate	ar than	0.01 Inch	110	Per AP-42	Section 1	3.2.1. Fl	nure 13.2.1-	2 (Richmon	d County N		1 -	_			1
Potential emissions calculated from appropriate emission factor ti Engineering Manual, Air and Waste Management Association, pag	mes vehicle r e 141. Cont	niles tr rol effic	aveled clency (	with contr %) = 96-0	ol efficiend .263*V, w	y of 90% f here V is t	or water / he numbe	dust sup of vehic	pression a	tivities folic nce applica	wed by swe tion of wate	eping. Pe r.	r Table 5 i	n Chapter	4 of the A	dr Pollution	1
sbreviations								•									
hr - hour			<u> </u>		tpy - tons	per year											
			1 1	-	VMT - veh	rle miles t	ra veled	-	-				_				-
Ib - pound																	
PM - particulate matter		i i	i j		VOC - vola	tile organ	ic compou	nd 1		-1							1

				Tabl	e 16					
				Diesel Stor	rage Tanks					
				IES-TK-1	through 3					
			E	nviva Pellet	s Hamlet, L	LC.		ar at - 1 - 1		
			Hamlet,	Richmond Co	ounty, Nort	h Carolina				
_		Design	Working	Tank Din	ensions <sup>5</sup>		Throughput <sup>3</sup>		VOC Em	vissions <sup>4</sup>
Source ID	Description	Volume*	Volume*	Diameter	Length	Orientation	moughput	Turnovers	VOC LI	13310113
		(gal)	(gal)	(ft)	(ft)		(gal/yr)		(lb/hr)	(tpy)
IES-TK-1	Emergency Generator Fuel Storage Tank <sup>2</sup>	1,000	500	5.3	6	Horizontal	15,958	31.9	1.3E-04	5.8E-04
IES-TK-2	Fire Pump Fuel Storage Tank <sup>2</sup>	185	93	3.3	3.3	Horizontal	4,500	48.6	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
						2 2 2 2	Total	Emissions:	9.3E-04	4.1E-03
tes:										
Conservative	design specifications.		1			3				
Working volur	ne conservatively assume	ed to be 50	% of tank de	sian volume	because ta	anks will not be	full at all time	s.		
Throughput for provided by E	or IES-TK-1 and IES-TK-2 nviva.	based on fu	el consump	tion provided	by Enviva	and 500 hours	of operation p	er year. Thr	oughput fo	r IES-TK-3
Emissions cale for IES-TK-2.	culated using EPA TANKS	4.0 softwar	e. A minimu	m tank lengt	h for the T	ANKS program	of 5 feet was u	sed to estim	ate the en	nissions
IES-TK-3 leng	th was estimated based	on the capa	city of the t	ank and the	diameter.				-	
vaviations	1									·
EDA Environ	1 Desta tion Anone						-			
ft - feet	 			VOC - volati	le organic c	ompound				
gal - gallon lb - pound	1	-				1				

1		-	_	Table 1	7			-	_			_		
			Dry Sha	vino Mater	ial Handlin	a								
				IES-DRYSH	AVE									
			Enviv	a Pellets Ha	miet. LLC					***				
		н	amlet, Rich	mond Count	y, North C	rolina		1						
Source	Transfer Activity	Number of Drop Points	Material Moisture Content <sup>1</sup>	PM Emission Factor <sup>2</sup>	PM <sub>10</sub> Emission Factor <sup>2</sup>	PM <sub>2.5</sub> Emission Factor <sup>2</sup>	Pe Thro	tential ughput <sup>3,4</sup>	Poten Emis	tial PM sions	Potent Emis	ial PM10 sions	Potenti Emis	al PM <sub>2.5</sub> sions
			(%)	(lb/ton)	(lb/ton)	(Ib/ton)	(tph)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IES-DRYSHAVE	Dry Shaving Material Handling - Truck dump to truck dumper	1	10%	4.5E-04	2.1E-04	3.2E-05	25	219,000	1.1E-02	4.9E-02	5.3E-03	2.3E-02	8.0E-04	3.5E-03
	Dry Shaving Material Handling - Bucket elevator to silo <sup>5</sup>	1	10%	4.5E-04	2.1E-04	3.2E+05	25	219,000	1.1E-03	4.9E-03	5.3E-04	2.3E-03	8.0E-05	3.5E-04
			1	10			Total	Emissions:	1.2E-02	5.4E-02	5.8E-03	2.5E-02	8.8E-04	3.9E-03
1							n							
lotes:														
1. Moisture conten	t for dry shavings based on information provided by Enviva.													
<sup>2</sup> Emission factor	calculation based on formula from AP-42, Section 13.2.4 - Aggr	egate Han	dling and St	orage Piles,	Equation 1	3.2.1, (11/	06).			1			1	1
where:	E = emission factor (lb/ton)	1											1	1
	k = particle size multiplier (dimensionless) for PM	0.74		1		~	1	1		1		•		
	k = particle size multiplier (dimensionless) for PM10	0.35					1	1				r	( )	1
	k = particle size multiplier (dimensionless) for PM	0.053												
	U = mean wind speed (mph)	7.85					· ·					-	- 1	1
3. Hourly throughp	ut based on a maximum transfer rate of 100 ton/hr of dry sha	vino mater	ial.											-
4. Annual through	out based on 4 dry shaving deliveries per week and a maximum	m storage i	anarity of 1	360 tons fo	r the dry st	avino mat	orial ct	nrade sile						
S. Bucket elevator	to sllo material handling transfer point emissions account for a	90% cont	ml efficiency	due to the	anclosed a	aturo of th	a cila /	Fan Dinne f	aunter 10	121				
		3		f and the time	citeo sea in		0 3110 (.	Jan Diego c	ounty, 19:		_		-	
hbreviations;		1												
hr - hour		÷												
ID - pound PM - particulate	matter	1			-									
PMin - particulate	matter with an aerodynamic diameter less than 10 microns						_							
PM <sub>2</sub> s - particulat	e matter with an aerodynamic diameter of 2.5 mirrons or less	-	1 1 1 1 1					-						
tpy - tons per ye	ar			- F							-			
yr-year	· · · · · · · · · · · · · · · · · · ·							1						/
1				ļ				1						
San Diego Count	y, 1993, Cement & Ely Ash Storage Silos, June 7, Available on	line at htt	ne i / havin ur e	] andiogogou	atu anulan	to n't (da m)	delen			-/	4 11 14			í
1	A service of the serv	inite at: IIIt	pa.//www.s	linnegocou	incy go v/cor	renydany	suc/ap	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	s_program	NAPCD_SI	JI.pal.			r
90%	Control efficiency for bucket elevator to silo drop													
25	tons/hr, maximum hourly transfer rate			1				li						
600	tons/day, maximum daily throughput													
365	ROYALVEAU			1 1			_	1 ·						1

			Table 18		
		Debarker	Potential Emissi	ions	
		IES	S-DEBARK-1		
		Enviva P	ellets Hamlet, L	LC	
	Ham	let, Richmoi	nd County, Nortl	h Carolina	
	Calculation Basis				
	Hourly Throughput <sup>1</sup>	275	ton/hr	]	
	Annual Throughput <sup>1</sup>	1,078,143	ton/yr		
			L		
-	Potential Criteria Pollutan	t Emissions			
	Source	Pollutant	Emission	Potential	Emissions
		Fondant	(lb/ton)	(lb/hr)	(tpy)
		TSP <sup>2</sup>	2.0E-02	0.55	1.1
	IES-DEBARK-1	PM <sub>10</sub> <sup>2</sup>	1.1E-02	0.30	0.59
	J				
N	otes:				L
	12/21/17). Annual through chipping. Per 12/21/17 em 1 ODT of pellets, and 1.15 t would purchase 75% of the coming from purchased chip	put of logs of ail from Envir times that ar needed log	delivered for deb va, 2 tons of gre mount for purcha is with the remai	arking, as report en material is ne sed logs. At mos ning 25% of gree	ed for log eded for every st, Enviva en material
<b>F</b> 2.	Particulate matter emission Subsystem Source Classifica Pollutants. Source Classifica to be larger than 2.5 micror due to the debarker being	factors from ation Codes and ation Code 3 ns in diamete partially encl	n the USEPA docu nd Emission Facto -07-008-01 (Log er. PM emissions losed (assumed	ument titled AIRS or Listing for Crite Debarking). All I are assumed to 90% control).	<i>Facility ria Air</i> <sup>9</sup> M is assumed be controlled
Al	breviations:				
_	hr - hour				
	lb - pound				
	ODT - oven dried tons				
	tpy - tons per year				
	yr-year				