



STATEMENT OF BASIS
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BAQ Air Permitting Division

Company Name:	Enviva Pellets Greenwood, LLC	Permit Writer:	Jo Anna Cunningham
Permit Number:	1240-0133-CC	Date:	DRAFT

DATE APPLICATION RECEIVED: February 10, 2020

FACILITY DESCRIPTION (SIC CODES 2499-Wood Products, NEC, NAICS CODES-321999 – All other wood product manufacturing) Enviva Pellets Greenwood, LLC. (herein referred to as Enviva Greenwood) owns and operates a Wood Pellet Manufacturing Facility in Greenwood, South Carolina. The facility started operating on September 22, 2016. The facility currently has been issued construction permits 1240-0133-CA, 1240-0133-CB, 1240-0133-CB-R1 and 1240-0133-CB-R2. Facility-wide federally enforceable synthetic minor limits for particulate matter (PM), particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM₁₀), particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}), and volatile organic compounds (VOC) to avoid Prevention of Significant Deterioration (PSD) and hazardous air pollutant (HAP) emission limits to avoid major HAP source status were established in 1240-0133-CA and were carried over in 1240-0133-CB, 1240-0133-CB-R1 and 1240-0133-CB-R2. These synthetic minor limits shall remain in-place with this project to maintain the facility's status as a non-major PSD source and an area source of HAP.

A facility-wide federally enforceable synthetic minor limit for carbon monoxide (CO) to avoid PSD was established in 1240-0133-CA however the potential to emit of CO is less than PSD major source threshold limits for the pellet plant as-built configuration. This limit is no longer necessary and will not be carried over with this project.

A facility-wide federally enforceable synthetic minor limit for Carbon Dioxide equivalent basis (CO_{2e}) to avoid PSD was established in 1240-0133-CA. The EPA's final rule states that PSD does not trigger for greenhouse gases (GHGs) unless they trigger for another pollutant. Since Enviva Greenwood has PSD avoidance limits on the pollutants (PM, PM₁₀, PM_{2.5} and VOCs) the CO_{2e} limit is no longer necessary and will not be carried over with this project.

With the issuance of this Synthetic Minor Construction Permit, the following construction permits 1240-0133-CA, 1240-0133-CB, 1240-0133-CB-R1, and 1240-0133-CB-R2 will be superseded by Synthetic Minor Construction Permit 1240-0133-CC.

The current permit application presents throughputs and emission factors for the process emission units based on Oven-Dried Short Tons (ODT). By the Wood Products Industry definition, ODT means the amount of wood that weighs 2,000 pounds at a zero percent moisture content. The Enviva Greenwood manufacturing process is based on the final dried wood pellet having a moisture content of approximately 5.5%. Due to the varying moisture content of wood throughout the Enviva Greenwood pellet manufacturing process, the use of ODT enables for standardization of throughputs and emissions factors.

Method to convert the Enviva processes from wet weight to dry weight

Moisture content on a wet basis is calculated with the following algorithm:

$$\text{Percent (\%)} \text{ moisture content wet basis} = (\text{wet weight} - \text{dry weight}) / \text{wet weight} \times 100$$

$$\text{Dry weight} = \text{wet weight} \times (1 - \% \text{ moisture content wet basis})$$

Example: For the Debarker, the weight of the wet wood is 230 tons; the moisture content of the wet wood is 50%.

$$\text{The conversion to dry weight} = 230 \text{ tons} \times (1 - 50\%) = 115 \text{ ODT}$$



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Reference document for wood conversion from wet basis to dried tons : <https://www.forestresources.org/digital-magazine/item/195-understanding-oven-dry-weight>

PROJECT DESCRIPTION

Permission is hereby granted to increase wood pellet production by adding additional equipment, adding particulate matter control devices, by reducing the volatile organic compounds (VOC) emissions from the Dry Hammermills, and by increasing the firing capacity of the existing VOC control devices. The facility will be limited to a wood pellet production limit of 660,000 oven dried short tons (ODT)/year. This project consists of the following modifications:

- Increase the wood pellet plant production limit to 660,000 ODT/year.
- Increase Woodyard throughput rate from 541,500 ODT per year to 876,000 ODT per year for the Debarker (E1) and 766,500 ODT per year for the other woodyard operations.
- Increase the amount of softwood processed from a maximum of 90% to 100%.
- Replace the existing five (5) Horizontal Dry Hammermills (DHMs) with thirty-six (36) new Vertical DHMs. Emissions will be controlled by the existing Wet Electrostatic Precipitator (WESP) (CD2) and Regenerative Thermal Oxidizer RTO1 (CD3) and, a new Bin Vent Filter (CD24).
- Add one (1) new Green Hammermill, three (3) new Pelletizers, one (1) new Pellet Cooler, one (1) new Baghouse and update the as-built configuration of the Dust Silo control devices to a single Cyclofilter (CD23).
- Update the firing capacity of (RTO1) (CD3) to four (4) burners each rated at 8 MMBtu / hr, update the firing capacity of RTO2/RCO1 (CD15) to 5.2 MM Btu/hr (single burner), and update the firing capacity of RTO3/RCO2 (CD19) to two (2) burners each rated at 5.2 MMBtu/hr.
- Add the following new exempt sources: Truck Dump 2, one (1) Electric Powered Radial Log Crane, and one (1) Air-to-Air Chiller. Note: the Electric Powered Radial Log Crane, and Air-to-Air Chiller are not sources of air emissions.
- Up-date the facility emissions to include emissions from existing sources including the Dryer Duct Burner, Furnace Bypass Stack (S15), and Fugitive Particulate Matter emissions from an existing truck dump and from vehicle traffic on unpaved and paved roads.

EXISTING FEDERALLY ENFORCEABLE LIMITS

The existing facility-wide federally enforceable synthetic minor limits for PM, PM₁₀, PM_{2.5}, and VOC to avoid PSD major source status shall remain in-place and be carried over with this project.

The existing facility-wide federally enforceable synthetic minor limits for HAP emission limits to avoid HAP major source status shall remain in-place and be carried over with this project.



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The existing facility-wide federally enforceable synthetic minor limit for carbon monoxide (CO) to avoid PSD which was established in 1240-0133-CA will not be carried over with this project because the pellet plant as-built configuration potential to emit of carbon monoxide (CO) is less than PSD major source threshold limits.

WOOD PELLET MANUFACTURING PROCESS

Wood is received as logs and wood chips. The logs are fed to a Debarker then go through the Chipper. Wood chips received via truck are sent through a screener and stored with the chips from the chipper in an outdoor chip pile. The chips are processed through the Green Hammermills and then stored in a green chip silo until they are sent to the Dryer. The heat for the Dryer is provided by a 200 MMBTU/hr bark fuel Furnace. Bark fuel is generated by the Debarker and received via truck. Bark fuel is stored in a fuel storage pile before being sent to the fuel storage feeder bin with the final destination being the furnace. From the Dryer, the chips are stored in the Dry Chip Silo and then go to the new Vertical Dry Hammermills, followed by the Pelletizer Feed Silo, Pelletizers and Pellet Coolers and the Pellet Silos. Finished wood pellets are loaded into railcars via the Loadout operations.

PROCESSES

- Process P0 – Woodyard - emissions minimized by Best Management Practices
- Process P1 – Green Hammermills, Green Chip Silo – emissions are controlled by control devices.
- Process P2 – Furnace, Rotary Dryer, Dryer Duct Burner, Dry Chip Silo – emissions are controlled by control devices, except for duct burner, which is uncontrolled.
- Process P3 – Vertical Dry Hammermills, Pelletizer Feed Silo – emissions are controlled by control devices.
- Process P4– Pelletizers, Pellet Coolers– emissions are controlled by control devices.
- Process P5 – Pellet Silo 1, Pellet Silo 2, Loadout, Dust Silo – emissions are controlled by control devices.
- Process P7 – Unpaved and Paved Roads – emissions minimized by Best Management Practices

PROCESS ADD-ON CONTROL DEVICES

Regenerative Thermal Oxidizer (RTO) to control VOC and HAPs and Toxic Air Pollutants (TAPs) from the following processes:

- Green Hammermills, Green Chip Silo, Furnace, Rotary Dryer, and Vertical Dry Hammermills

Note: Thermal oxidation reduces VOC emissions by oxidizing VOC to carbon dioxide (CO₂) and water vapor (H₂O) at a high temperature.

RTO / Regenerative Catalytic Oxidizers (RCO) to control VOC, HAPs and TAPs from the following processes:

- Pelletizers and Pellet coolers

Note: A RCO is similar to a RTO. A RCO uses a catalyst to lower the temperature necessary to oxidize VOC compounds to carbon dioxide and water vapor.

Wet Electrostatic Precipitator (WESP) to control particulate matter from the following processes:

- Green Hammermills, Green Chip Silo, Furnace, Rotary Dryer, and Vertical Dry Hammermills

Baghouse(s) to control particulate matter from the following processes:

- Pelletizers and Pellet coolers, Finished Wood Pellet Loadout



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Cyclofilters to control particulate matter from the following processes:

- Pellet Silos, Dust Silo and existing horizontal Dry Hammermills, which are proposed to be replaced by the new vertical Dry hammermills

Cyclone 6 (CD21) required for the operation of Baghouse 3 (CD23) to control particulate matter from the Finished Wood Pellet loadout

Bin Vent Filters to control particulate matter from the following processes:

- Dry Chip Silo, Pelletizer Feed Silo, Vertical Dry Hammermills,

Process Material Recovery

The Cyclone Pack (Multiclone) CD1 is used for material recovery and not pollution control. CD1 does not vent to the ambient air. It is in series with the WESP (CD2) and RTO1 (CD3)

New Process Equipment

Thirty Six (36) New Vertical Dry Hammermills (DHMs)

Exhaust from the new vertical DHMs will be routed to:

- A new bin vent filter [Bin Vent Filter 3 (CD24)] followed by a safety water quench duct and then to the dryer furnace (E11) followed by the existing WESP (CD2) and RTO1 (CD3);
- A safety water quench duct and then the existing WESP (CD2) followed by the existing RTO1 (CD3); or
- A combination of the two routing options.

Three (3) New Pelletizers and One (1) New Pellet Cooler

The exhaust from this equipment will be routed to a baghouse (CD-18c) for PM control followed by RTO3/RCO2 (CD19) for VOC and HAP control.

One (1) New Green Hammermill

New Exempt Sources

Air-to-Air Chiller – The air-to-air chiller is an electric powered air conditioner that will enhance the cooling of pellets moving through the pellet coolers.; Electric Powered Radial Log Crane; Truck Dump 2.

Note: The Air-to-Air Chiller and Electric Powered Radial Log Crane are not sources of emissions.

New Control Devices

Baghouse - Will be installed to reduce particulate matter emissions present in the pellet cooler exhaust air.

Bin Vent Filter – Will be installed to reduce particulate matter emissions present in the new Vertical Dry Hammermills exhaust stream.



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Furnace (E11) Bypass Operations via the Furnace Bypass Stack (S15)

Cold Start-Ups - The furnace bypass stack is used when the furnace is started up from a cold shut down until the secondary combustion zone temperature approaches 600° F. Once the secondary combustion zone temperature reaches 600° F, the Dryer induction draft fan is started. Although the bypass stack remains open at this point it will no longer be used to exhaust emissions but will be used to draw ambient air into the unit and exhaust through the Dryer and downstream control devices until the secondary combustion zone reaches 900° F when the bypass stack is closed, and normal Furnace operations can proceed. The purpose of the bypass stack remaining open during the 600° - 900° F period is to allow ambient air to enter the unit when the induction fan is started. If the bypass stack does not remain open the induction fan would pull all the air it requires through the furnace which would be too much to support combustion until the secondary combustion zone reaches 900° F. Approximately 15-30 gallons of diesel fuel will be used as an accelerant for each start-up (up to 100 -200 gallons per year) and the heat rate of the furnace during this initial stage of the start-up is not expected to exceed 15% of the maximum heat input of the furnace (30 MM Btu/hr heat input maximum).

Use of the furnace bypass stack for cold start-ups will not exceed eight (8) hours per start-up and 50 hours per year, total. Criteria pollutant, HAP and TAP emissions, which occur during cold start-up, were calculated based on emission factors from AP-42, Section 1.6, Wood Residue Combustion in Boilers and Section 1.3, Fuel Oil Combustion.

Record keeping and reporting of these events shall be required.

Idle Mode - The furnace bypass stack may be used when the furnace is operating in Idle Mode. Operation in Idle Mode is needed to maintain the temperature of the fire brick lining the furnace to prevent damage from rapid temperature changes. Operation in idle mode also reduces the amount of time required to restart the dryer. Furnace emissions are only vented through the bypass stack in idle mode when the facility is either conducting maintenance and cleaning of the WESP and RTO, or during dryer system repairs including repairs to raw material input and product discharge.

Furnace Idle Mode shall be defined as furnace operation up to a maximum heat input rate of 12 MM Btu/hr. The furnace may operate up to (500) hours per year, total. Criteria pollutant, HAP and TAP emissions, which occur when the furnace operates in Furnace Idle Mode, were calculated based on emission factors from AP-42, Section 1.6, Wood Residue Combustion in Boilers.

Malfunction - The furnace bypass stack will be used in the event of a malfunction. The fuel feed will automatically stop, and the furnace maximum heat input will drop down to Idle Mode heat input.

Record keeping and reporting of these events shall be required.

Planned Shutdown - When the facility has scheduled a Planned Shutdown, the furnace heat input will be decreased, and all remaining fuel will be moved through the processing system to prevent a fire. The fuel remaining in the furnace will be combusted prior to opening the furnace bypass stack. Emissions will continue to be controlled by the WESP (CD2) and RTO (CD3), until the furnace reaches Furnace Idle Mode or is shut down completely.



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Record keeping and reporting of these events shall be required.

Rotary Dryer (E12) Bypass Operations via the Dryer Bypass Stack

Malfunction - The rotary dryer bypass stack will be used if there is power failure, equipment failure, interlock trip, or if there is a furnace abort. Numerous Dryer operation interlocks exist for equipment downstream of the Dryer including but not limited to Dryer Cyclone plugage, Dryer ID fan operation, WESP and RTO operation. If an interlock failure occurs, raw material feed to the Dryer will stop and the dryer will abort through the Dryer Bypass Stack.

Record keeping and reporting of these events shall be required.

Planned Shutdown - The rotary dryer bypass stack will be used when the facility has scheduled a planned shutdown. As the remaining fuel is combusted by the furnace, the chip input to the rotary dryer is reduced. When a small amount of chips remains, the dryer drum will be emptied. At this point, the dryer bypass stack will be opened. A purge air fan will be used to ensure no explosive build-up of flammable gas occurs in the drum. The furnace and dryer are no longer operating, and as such, emissions are not generated.

Record keeping and reporting of these events shall be required.

SOURCE TEST REQUIREMENTS

Pollutants: PM, PM₁₀, PM_{2.5}, VOC, CO, NO_x, Acetaldehyde, Acrolein, Formaldehyde, Methanol, Phenol, and Propionaldehyde

To verify PM, PM₁₀, PM_{2.5}, VOC, CO, NO_x, Acetaldehyde, Acrolein, Formaldehyde, Methanol, Phenol, and Propionaldehyde emissions and, to ensure continuing compliance with the existing facility-wide synthetic minor emission limits for PSD Avoidance (PM, PM₁₀, PM_{2.5}, VOC) and major HAP source Avoidance (facility-wide HAPs < 10/25 tpy), a source test shall be conducted within 180 days after project completion and the start-up of new and modified equipment. With the exception of CO and NO_x, subsequent source tests shall be conducted annually and completed no later than twelve (12) months after the previous source test. Subsequent source tests for CO and NO_x shall be conducted every 5 years and completed no later than sixty (60) months after the previous source test. The source test requirement is applicable to the following process equipment, emission points and pollutants:

EU ID	Source	Testing Location (Emission Point ID)	Pollutants
E6-E9, E58, E10, E11, E12, E59-E94	Green Hammermills, Green Chip Silo, Furnace, Dryers, Dry Hammermills	S1	PM, PM ₁₀ , PM _{2.5} , VOC, CO, NO _x , Acetaldehyde, Acrolein, Formaldehyde, Methanol, Phenol, and Propionaldehyde



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EU ID	Source	Testing Location (Emission Point ID)	Pollutants
E20-E31	Pelletizers 1 – 9, Pellet Coolers 1 - 3	S5	PM, PM ₁₀ , PM _{2.5} , VOC, CO, NO _x , Acetaldehyde, Acrolein, Formaldehyde, Methanol, Phenol, and Propionaldehyde
E32 – E39, E49 – E52	Pelletizers 10 – 18, Pellet Coolers 4 – 6	S6	PM, PM ₁₀ , PM _{2.5} , VOC, CO, NO _x , Acetaldehyde, Acrolein, Formaldehyde, Methanol, Phenol, and Propionaldehyde

The source test will be used to verify emission rates in units of pounds per hour (lb/hr) and to establish and/or re-establish site specific emission factors, for each process equipment, in units of pounds per oven-dried short tons (lb/ODT). For all particulate matter control devices except the WESP, the facility shall also monitor and record the pressure drop across the control device to establish or re-establish pressure drop ranges needed to ensure compliance with PM, PM₁₀, and PM_{2.5} emission limits. For the WESP, the facility shall also monitor and record the secondary voltage and current for each grid to establish or re-establish voltage and current ranges needed to ensure compliance with PM, PM₁₀, and PM_{2.5} emission limits. For all thermal incineration control devices, the facility shall also monitor and record the combustion zone temperature to re-establish operating temperatures needed to ensure compliance with VOC emission limits.

The facility may request that the source tests be conducted less often than annually for a given pollutant if the source tests for at least three (3) consecutive tests indicate facility wide emissions will be less than 85% of the synthetic minor limits. If the request is granted, the facility shall conduct a source test no more than 36 months after the previous source test for the given pollutant. If a subsequent source test indicates facility wide emissions will be greater than 85% of the synthetic minor limits, the facility shall return to conducting annual source tests (no later than 12 months after the previous source test) for that pollutant.

The Department believes after three annual source tests there should be sufficient data to indicate what the actual emissions are at a given production rate, and the use of a threshold of 85% of the synthetic minor limits will provide an adequate safety factor for granting a less frequent source test schedule.

All emissions points, duct work and other locations that are required to be tested, shall be designed and constructed in a manner to facilitate testing in accordance with applicable EPA approved source testing methods including, but not limited to, methods specifying test port location and sizing criteria. Sampling port locations shall be established in a place that is adequate for test methods; and safe to access and sample.

Rationale for proposed source test frequency to meet the requirements of on-going compliance:

- I. The annual testing frequency is consistent with wood pellet plant permits for facilities such as Enviva Sampson, North Carolina, Air Quality Permit No. 10386R04 and recently issued SC DHEC, BAQ, Jasper Pellets, permit # 1360-0050-CC.



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- II. Recent testing at Pellet Manufacturing Plants demonstrates that emissions at wood pellet plants are highly variable. As such yearly source testing will ensure continued compliance with the synthetic minor limits. References: August 28, 2014 stack tests on the pellet coolers at Hazlehurst Wood Pellets in Georgia (emission factor of 0.30 lb/ODT), testing performed at that same plant on December 16, 2015 (emission factor of 0.62 lb/ODT).

MONITORING

- I. The owner/operator shall continue to monitor RTO and RTO/RCO Combustion Zone Temperature. Rationale to meet the requirements of on-going compliance with the synthetic minor limits for PSD and major HAP Avoidance.
- II. The owner/operator shall continue to monitor WESP secondary voltage and current. Rationale to meet the requirements of on-going compliance with the synthetic minor limits for PSD and major HAP Avoidance.
- III. The owner/operator shall continue to monitor Baghouse Pressure Differential. Rationale to meet the requirements of on-going compliance with the synthetic minor limits for PSD and major HAP avoidance.
- IV. The owner/operator shall continue to monitor Bin Vent Pressure Differential. Rationale to meet the requirements of on-going compliance with the synthetic minor limits for PSD and major HAP avoidance.
- V. The owner/operator shall continue to monitor Cyclofilter Pressure Differential. Rationale to meet the requirements of on-going compliance with the synthetic minor limits for PSD and major HAP avoidance.
- VI. The owner/operator shall continue to perform routine maintenance on the Cyclone. Rationale to meet the requirements of on-going compliance with the synthetic minor limits for PSD and major HAP Avoidance.

RECORD KEEPING

The owner/operator shall continue to perform emissions calculations on a monthly basis and a 12-month rolling sum shall be calculated for VOC, PM, PM₁₀, PM_{2.5} and HAP. Emissions calculations shall be based on the site-specific emission factors, as established in the most recent source test. Rationale to meet the requirements of on-going compliance with the synthetic minor limits for PSD and non-major source for HAPs.

The owner/operator shall use the initial emission factors, identified in the Statement of Basis until new emission factors that are developed from the initial source testing have been approved to use.

REPORTING

- I. With this construction project, the emissions from the Vertical DHMs will controlled by the WESP, RTO and new Bin Vent Filter. Compliance with the synthetic minor limits shall continue to be achieved. Semi-Annual reporting shall continue to be required.



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PROJECT EMISSIONS						
Pollutant	Uncontrolled		Controlled		Controlled & Limited	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
P0/E1 - Debarking						
PM	2.7	11.82	2.7	11.82	2.7	11.82
PM ₁₀	0.07	0.32	0.07	0.32	0.07	0.28
PM _{2.5}	0.01	0.05	0.01	0.05	0.01	0.05
P0/E2 - Chipping						
VOC	0.44	1.92	0.44	1.92	0.44	1.92
PM	1.68	7.36	1.68	7.36	1.68	7.36
PM ₁₀	0.84	3.68	0.84	3.68	0.84	3.68
PM _{2.5}	0.84	3.68	0.84	3.68	0.84	3.68
P0/E3 - Screening						
PM	0.33	1.46	0.33	1.46	0.33	1.46
PM ₁₀	0.33	1.46	0.33	1.46	0.33	1.46
PM _{2.5}	0.33	1.46	0.33	1.46	0.33	1.46
P0/E4 - Pile Drop						
PM	0.01	0.06	0.01	0.06	0.01	0.06
PM ₁₀	6.16E-03	0.03	6.16E-03	0.03	6.16E-03	0.03
PM _{2.5}	9.33E-04	4.09E-03	9.33E-04	4.09E-03	9.33E-04	4.09E-03
P0/E5 - Pile Erosion						
PM	0.65	2.83	0.65	2.83	0.65	2.83
PM ₁₀	0.32	1.41	0.32	1.41	0.32	1.41
PM _{2.5}	0.05	0.21	0.05	0.21	0.05	0.21
VOC	0.69	3.03	0.69	3.03	0.69	3.03
P0/E46 - Truck Dump 1						
PM	5.88E-03	0.03	5.88E-03	0.03	5.88E-03	0.03
PM ₁₀	2.78E-03	0.01	2.78E-03	0.01	2.78E-03	0.01
PM _{2.5}	4.21E-04	1.84E-03	4.21E-04	1.84E-03	4.21E-04	1.84E-03
P0/E46 - Truck Dump 2						
PM	5.88E-03	0.03	5.88E-03	0.03	5.88E-03	0.03
PM ₁₀	2.78E-03	0.01	2.78E-03	0.01	2.78E-03	0.01
PM _{2.5}	4.21E-04	1.84E-03	4.21E-04	1.84E-03	4.21E-04	1.84E-03
P1/E6-E9 - Green Hammermill 1 through 4; P1/E10 - Green Chip Silo; P1/E58 -Green Hammermill 5; P2/E11 - Furnace; P2/E12 - Dryer						
PM	256.77	1,125	2.57	11.25	2.57	11.25
PM ₁₀	256.77	1,125	2.57	11.25	2.57	11.25
PM _{2.5}	256.77	1,125	2.57	11.25	2.57	11.25
CO	13.65	59.80	13.65	59.80	13.65	59.80
SO ₂	5.00	21.90	5.00	21.90	5.00	21.90
NO _x	25.59	112.07	25.59	112.07	25.59	112.07
VOC	187.30	820.37	9.36	41.02	9.36	41.02



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PROJECT EMISSIONS						
Pollutant	Uncontrolled		Controlled		Controlled & Limited	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
P2/E11 – Furnace Bypass Stack (Furnace Cold Start-up; Furnace Idle Mode)						
PM	24.27	106.15	24.27	106.15	24.27	2.16
PM ₁₀	21.75	95.11	21.75	95.11	21.75	1.94
PM _{2.5}	18.81	82.23	18.81	82.23	18.81	1.68
CO	25.25	110.38	25.25	110.38	25.25	2.25
SO ₂	1.05	4.60	1.05	4.60	1.05	0.09
NO _x	9.44	40.47	9.44	40.47	9.44	0.83
VOC	0.72	3.13	0.72	3.13	0.72	0.06
P2/E12 – Dryer Bypass Stack (Planned Shutdown)						
Furnace (E11) and Dryer (E12) Not operating, no emissions generated						
P2/E13 – Dry Chip Silo						
PM	17.14	75.09	0.17	0.75	0.17	0.75
PM ₁₀	17.14	75.09	0.17	0.75	0.17	0.75
PM _{2.5}	17.14	75.09	0.17	0.75	0.17	0.75
VOC	1.25	5.50	1.25	5.50	1.25	4.69
P2/E48 – Dryer Duct Burner						
PM	0.04	0.16	0.04	0.16	0.04	0.16
PM ₁₀	0.04	0.16	0.04	0.16	0.04	0.16
PM _{2.5}	0.04	0.16	0.04	0.16	0.04	0.16
CO	0.41	1.80	0.41	1.80	0.41	1.80
SO ₂	2.94E-03	0.01	2.94E-03	0.01	2.94E-03	0.01
NO _x	0.49	2.15	0.49	2.15	0.49	2.15
VOC	0.03	0.12	0.03	0.12	0.03	0.12
P3/E14 through E18 – Dry Hammermill 1 through 5 (existing but have been proposed to be removed with this construction project);						
P3/E59 – through E94 – Vertical Dry Hammermill 1 through Vertical Dry Hammermill 36						
PM	1,506	6,596	15.06	65.96	15.06	56.27
PM ₁₀	1,506	6,596	15.06	65.96	15.06	56.27
PM _{2.5}	1,506	6,596	15.06	65.96	15.06	56.27
*CO	0.0	0.0	0.17	0.73	0.17	0.62
*NO _x	0.0	0.0	0.20	0.86	0.20	0.74
* There are no uncontrolled CO or NO _x emissions from the DHMs. CO and NO _x result from thermal oxidation						
VOC	108.80	476.54	5.44	23.83	5.44	20.33
P3/E19 – Pelletizer Feed Silo						
PM	17.14	75.09	0.17	0.75	0.17	0.75
PM ₁₀	17.14	75.09	0.17	0.75	0.17	0.75
PM _{2.5}	17.14	75.09	0.17	0.75	0.17	0.75
VOC	0.02	0.08	0.02	0.08	0.02	0.07



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PROJECT EMISSIONS						
Pollutant	Uncontrolled		Controlled		Controlled & Limited	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
P4/E20 - E22 Pelletizer 1 through 3 P4/E23 - Pellet Cooler 1; P4/E24 - E26 -Pelletizer 4 through 6; P4/E27 - Pellet Cooler 2; P4/E28 - E30 -Pelletizer 7 through 9; P4/E31 - Pellet Cooler 3						
PM	428.57	1,877	4.32	18.94	4.32	18.94
PM ₁₀	111.86	489.93	1.16	5.07	1.16	5.07
PM _{2.5}	69.13	251.46	0.69	2.51	0.69	2.51
*CO	0.0	0.0	4.84	21.22	4.84	17.62
*NO _x	0.0	0.0	0.82	3.58	0.82	2.97
* There are no uncontrolled CO or NO _x or SO ₂ emissions from pelletizing. CO and NO _x and SO ₂ result from thermal oxidation.						
SO ₂	0.0	0.0	3.06E-03	0.01	3.06E-03	0.01
VOC	134.77	590.28	6.74	29.51	6.74	24.51
P4/E32 -E34 - Pelletizer 10 through 12; P4/E35 - Pellet Cooler 4; P4/E36 - E38 - Pelletizer 13 through 15; P4/E39 - Pellet Cooler5; P4/E49 - E51 Pelletizer 16 through 18; P4/E52 - Pellet Cooler 6						
PM	428.57	1,877	4.36	19.11	4.36	19.11
PM ₁₀	111.86	489.93	1.20	5.24	1.20	5.24
PM _{2.5}	69.13	251.46	0.69	2.51	0.69	2.51
*CO	0.0	0.0	4.84	21.22	4.84	17.62
*NO _x	0.0	0.0	0.82	3.58	0.82	2.97
* There are no uncontrolled CO or NO _x or SO ₂ emissions from pelletizing. CO and NO _x and SO ₂ result from thermal oxidation.						
SO ₂	0.0	0.0	6.12E-03	0.03	6.12E-03	0.03
VOC	134.77	590.28	6.74	29.51	6.74	24.51
P5/E40, E41 - Pellet Silo 1, Pellet Silo 2						
PM	17.14	75.09	0.17	0.75	0.17	0.75
PM ₁₀	17.14	75.09	0.17	0.75	0.17	0.75
PM _{2.5}	17.14	75.09	0.17	0.75	0.17	0.75
P5/E42 - Loadout						
PM	98.57	431.74	0.99	4.32	0.99	4.32
PM ₁₀	98.57	431.74	0.99	4.32	0.99	4.32
PM _{2.5}	98.57	431.74	0.99	4.32	0.99	4.32
P5/E43 - Dust Silo						
PM	28.29	123.89	0.28	1.24	0.28	1.24
PM ₁₀	28.29	123.89	0.28	1.24	0.28	1.24
PM _{2.5}	28.29	123.89	0.28	1.24	0.28	1.24
Dried Wood Handling (Dry Chip Silo (P2/E13) and Pelletizer Feed Silo (P3/E19))						
Formaldehyde	0.074	0.32	0.074	0.32	0.074	0.28
Methanol	0.17	0.75	0.17	0.75	0.17	0.64
P6/E44 - Emergency Generator, 865 bhp, fueled with diesel fuel						
PM	0.03	8.58E-03	0.03	8.58E-03	0.03	0.009



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PROJECT EMISSIONS						
Pollutant	Uncontrolled		Controlled		Controlled & Limited	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
PM ₁₀	0.03	8.58E-03	0.03	8.58E-03	0.03	0.009
PM _{2.5}	0.03	8.58E-03	0.03	8.58E-03	0.03	0.009
CO	0.76	0.19	0.76	0.19	0.76	0.19
SO ₂	9.41E-03	2.35E-03	9.41E-03	2.35E-03	9.41E-03	0.002
NO _x	10.95	2.74	10.95	2.74	10.95	2.74
VOC	0.02	4.77E-03	0.02	4.77E-03	0.02	0.005
P6/E45 - Fire Water Pump, 305 bhp, fueled with diesel fuel						
PM	0.1	0.03	0.1	0.03	0.1	0.03
PM ₁₀	0.1	0.03	0.1	0.03	0.1	0.03
PM _{2.5}	0.1	0.03	0.1	0.03	0.1	0.03
CO	1.75	0.44	1.75	0.44	1.75	0.44
SO ₂	3.3E-03	8.30E-04	3.3E-03	8.30E-04	3.3E-03	0.001
NO _x	2.02	0.50	2.02	0.50	2.02	0.50
VOC	5.36E-03	1.34E-03	5.36E-03	1.34E-03	5.36E-03	0.001
P6/E53 - Diesel Fuel Storage Tank						
VOC	1.98E-04	8.65E-04	1.98E-04	8.65E-04	1.98E-04	8.65E-04
P6/E54 - Diesel Fuel Storage Tank						
VOC	3.32E-05	1.45E-04	3.32E-05	1.45E-04	3.32E-05	1.45E-04
P6/E55 - Diesel Fuel Storage Tank						
VOC	6.58E-05	2.88E-04	6.58E-05	2.88E-04	6.58E-05	2.88E-04
P7/E56 - Unpaved Roads						
PM	63.03	276.09	6.30	27.61	6.30	27.61
PM ₁₀	17.97	78.7	1.80	7.87	1.80	7.87
PM _{2.5}	1.80	7.87	0.18	0.79	0.18	0.79
P7/E57 - Paved Roads						
PM	4.98	21.79	0.50	2.18	0.50	2.18
PM ₁₀	1.00	4.36	0.10	0.44	0.10	0.44
PM _{2.5}	0.24	1.07	0.02	0.11	0.02	0.11

A summary of stack test-based emission factors utilized in the emissions calculations in the current permit application along with the justification for their selection is provided this Statement of Basis.



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FACILITY WIDE EMISSIONS									
Pollutant	Prior to Construction Colombo Basis			Prior to Construction Colombo Permitted Emissions Plus Existing Unpermitted Emissions			Post Construction Enviva Basis		
	Uncontrol	Controlled	Limited	Uncontrol	Controlled	Limited	Uncontrol	Controlled	Limited
	TPY	TPY	TPY	TPY	TPY	TPY	TPY	TPY	TPY
PM	13,948	151	148	14,289	281	174	12,684	283	168 / < 250
PM ₁₀	13,948	151	148	14,109	253	157	9,667	206	103 / < 250
PM _{2.5}	11,958	132	128	12,047	215	131	9,102	179	89 / < 250
SO ₂	22.5	22.5	22.5	27.1	27.1	22.6	27	27	22
NO _x	249	249	249	292	292	252	158	166	125
CO	249	249	249	361	361	253	173	216	100 / < 250
VOC	2906	305	247	2,909	308	247	2,491	138	120 / < 250
Pb	0	0	0	5.10E-02	1.20E-02	3.34E-03	5.10E-02	1.20E-02	3.34E-03
Highest HAP Formaldehyde (Cas # 50-00-0)	17.2	1.60	1.33	18.0	2.41	1.35	91.39	5.67	4.40 / < 10
Total HAP	52.1	5.10	4.22	57.9	10.9	4.38	416.35	29.18	22.40 / < 25

- Uncontrolled emissions (TPY) are based on the process(es) maximum hourly throughput, operating at 8,760 hours/year.
- Controlled emissions (TPY) are based on the process(es) maximum hourly throughput, operating at 8,760 hours/year and, the application of control device efficiencies.
- Controlled & Limited emissions (TPY) emissions are based on the process(es) annual throughput and, the application of control device efficiencies. Additionally, for the specified pollutants, Federally Enforceable Synthetic Minor limits for PSD and or major HAP Avoidance are applicable.

OPERATING PERMIT STATUS

The facility submitted a Title V operating permit application on August 23, 2017. The facility currently operates under the following construction permits: 1240-0133-CA was issued on August 23, 2013, 1240-0133-CB was issued on January 12, 2018, 1240-0133-CB-R1 was issued March 20, 2018 and 1240-0133-CB-R2 was issued on October 2, 2018.

With the issuance of this Synthetic Minor Construction Permit, the following construction permits 1240-0133-CA, 1240-0133-CB, 1240-0133-CB-R1, and 1240-0133-CB-R2 will be superseded by Synthetic Minor Construction Permit 1240-0133-CC.

REGULATORY APPLICABILITY REVIEW	
Regulations	Comments/Periodic Monitoring Requirements
Section II.E – Synthetic Minor	Applicable – This construction project is a synthetic minor construction permit to establish a new production limit of 660,000 ODT/year of finished dried wood



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REGULATORY APPLICABILITY REVIEW	
Regulations	Comments/Periodic Monitoring Requirements
	<p>pellets. Federally Enforceable limits for PM, PM₁₀, PM_{2.5}, VOC and HAP emissions were established with construction permit 1240-0133-CA to avoid PSD and HAP Major Source applicability. These synthetic minor limits shall remain in-place with this project.</p> <p>The federally enforceable synthetic minor limit for carbon monoxide (CO) to avoid PSD which was established in 1240-0133-CA will not be carried over with this project because the pellet plant as-built configuration potential to emit of CO is less than PSD major source threshold limits.</p> <p>A facility-wide federally enforceable synthetic minor limit for Carbon Dioxide equivalent basis (CO_{2e}) to avoid PSD was established in 1240-0133-CA. The EPAs final rule states that PSD does not trigger for greenhouse gases (GHGs) unless they trigger for another pollutant. Since Enviva Greenwood has PSD avoidance limits on the pollutants (PM, PM₁₀, PM_{2.5} and VOCs) the CO_{2e} limit is no longer necessary and will not be carried over with this project.</p>
Standard No. 1	Applicable - The existing 5 MM Btu/hr, natural gas fired Dryer Duct Burner (E48) meets the criteria of a fuel burning source as defined by Standard 1. The Dryer Duct Burner is subject to the PM = 0.6 lb/MM Btu, 20% Opacity and SO ₂ = 2.3 lb/MM Btu emissions limits of this standard.
Standard No. 3 (state only)	<p>The RTO and RTO / RCO's are considered industrial incinerators and are subject to the PM 0.5 lb/MM Btu total heat input and 20% Opacity limits of this standard.</p> <p>The Thermal Incineration Control Devices utilize natural gas in the burners as a source of heat to start and maintain the combustion of the VOC laden exhaust stream from the pellet processes. Natural gas is a clean burning virgin fuel. The exhaust stream from the processes consists of volatile organic compounds. Because there is minimal particulate matter in the combustion fuels, compliance with the Standard No. 3 PM limit is assured. The Department reserves the right to require testing if either the starter fuel or process exhaust stream constituents change.</p> <p>With this construction project, exhaust from the vertical dry hammermills may be routed to the existing furnace fire box above the furnace grate. Standard No. 3 is not applicable because, the exhaust stream is passing to the fire box above the furnace grate and not the actual furnace burners. Because the furnace burner, only burns clean untreated bark/hog fuel (i.e. wood chips, fines, sawdust) as fuel, Standard No. 3 is not applicable.</p>
Standard No. 4	Applicable - The Standard 4 PM and 20% opacity limits are applicable to the process IDs P0 thru P05. Process P06 (E53, E54, E55) Diesel Fuel Storage Tanks



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REGULATORY APPLICABILITY REVIEW	
Regulations	Comments/Periodic Monitoring Requirements
	are subject to Standard 4 for opacity however, the storage tanks do not emit PM, therefore PM compliance is assured. Process P07 Paved and Unpaved Roads is subject to the SC Regulation 61-62.6 – Fugitive emissions.
Standard No. 5.2	<p>Applicable - The 200 MM Btu/hr Furnace (fueled with bark and wood chips) is subject to NO_x emission limit of this standard. The Standard No. 5.2 emission limit as stated: Low-NO_x burners or equivalent technology, shall achieve 30 percent reduction from uncontrolled levels. This existing limit shall be carried over into this construction project.</p> <p>On December 6, 2017 Enviva submitted the vendor guarantee which stated the NO_x emissions from the Furnace are estimated to be 30% less than standard a grate furnace bark combustion systems.</p> <p>Enviva Greenwood (12/2018; 1/2019; 3/2019) Source Test NO_x EF with an added contingency 0.34 lb/ODT; NO_x emissions = 25.6 lb/hr. The furnace is in compliance with Standard No. 5.2 (NO_x emissions are less than 31.57 lb/hr).</p> <p>Each Regenerative Thermal Oxidizer (RTO) and Regenerative Thermal Oxidizer (RTO)/ Regenerative Catalytic Oxidizer (RCO) is exempt from Standard No. 5.2 per Section I (B)(4).....'Any device functioning solely as a combustion control device'.</p> <p>The Dryer Duct Burner (E48) is exempt from Standard No. 5.2 per Section 1 (B) (1) Any source emitting NO_x listed on the Regulation 61-62.1, Section II(B), Exemptions. (The NO_x emission from the dryer duct burner are less than 5 tons/year).</p>
Standard No. 7	<p>Not Applicable</p> <p>For PSD Applicability this facility falls within the 250 tons per year source category. For PSD Applicability, only those emissions from point sources are counted towards determining PSD applicability. Fugitive emissions are excluded, unless the facility is within one of the 28 source categories with a 100 tons per year threshold. For quantifying facility-wide total emissions, emissions from point sources and fugitive emissions are counted in the facility total emissions.</p> <p>This construction project does not trigger PSD. Federally enforceable limits (PM, PM₁₀, PM_{2.5}, CO, VOC) were established with construction permit 1240-0133-CA to avoid PSD. Additionally, with the federally enforceable requirement to operate the control devices, to limit the potential to emit, the project's emissions are less than 250. PSD will not be triggered.</p>
61-62.6	Applicable - The fugitive PM emissions are controlled in a manner that should not produce undesirable levels of PM emissions.



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REGULATORY APPLICABILITY REVIEW	
Regulations	Comments/Periodic Monitoring Requirements
40 CFR 60 and 61-62.60	<p>Applicable - The existing 865 bhp emergency generator (E44) and existing 305 bhp fire pump (E45) are each subject to 40 CFR 60 Subpart IIII.</p> <p>40 CFR 60 Subpart Db - Standards of Performance for Industrial Commercial - Institutional Steam Generating Units is not applicable to the 200 MM Btu/hr, bark-fired furnace (E11) because the furnace does not meet the definition of a steam generating unit (steam generating unit means a device that combusts any fuel or byproduct/waste and produces steam or heats water or heats any heat transfer medium).</p> <p>40 CFR 60 Subpart Dc - Standards of Performance for Small Industrial Commercial -Institutional Steam Generating Units is not applicable to the Dryer Duct Burner (E48) because it does not meet the definition of a steam generating unit. Steam generating unit means a device that combusts any fuel or byproduct/waste and produces steam or heats water or heats any heat transfer medium). Also, the Dryer Duct Burner has a maximum heat input of 5 MM Btu/hr which is less than the size threshold specified by the regulation.</p> <p>40 CFR 60 Subpart Kb - Volatile Organic Liquid Storage Vessels is not applicable to the facility's storage tanks (existing 660-gallon diesel fuel storage tank (E55), September 2016 installation, existing 359-gallon diesel fuel storage tank (E54), September 2016 installation, existing 2,000 gallon diesel tank (E53), September 2016 installation) because the tanks do not have maximum storage capacity greater than or equal to 39,890 gallons of a volatile organic liquid and therefore, the facility is not subject to Subpart Kb.</p> <p>40 CFR 60 Subpart IIII - Stationary Compression Ignition Internal Combustion Engines - The existing diesel-fired emergency generator (E44) and the fire pump engine (E45) are each subject to this regulation and shall continue to comply with Subpart IIII standards for the engines.</p>
40 CFR 63 and 61-62.63	<p>The facility has established federally enforceable facility-wide limits on HAPs emissions, less than 10 tons per year for any single HAP and less than 25 tons per year for total combined HAPs. Therefore, this facility is categorized as an Area Source for Air Toxics.</p> <p>The existing 865 bhp emergency generator (E44) and existing 305 bhp fire pump (E45) are each subject to 40 CFR 63 Subpart ZZZZ - NESHA for Stationary Reciprocating Internal Combustion Engines.</p> <p>40 CFR 63 Subpart DDDD - National Emission Standards For Hazardous Air Pollutants: Plywood And Composite Wood Products (PCWP) is not applicable to</p>



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REGULATORY APPLICABILITY REVIEW

Regulations	Comments/Periodic Monitoring Requirements
	<p>this facility because Subpart (4D) is applicable to PCWP manufacturing facilities which are a major source of hazardous air pollutants (HAP) emissions. This facility has established federally enforceable limits (Facility-Wide HAPs <10/25 tpy) and is categorized as an Area source for HAPs. A second reason that Subpart (4D) is not applicable to this facility is because Subpart (4D) applies to facilities that manufacture plywood and/or composite wood products by bonding wood material (fibers, particles, strands, veneers, etc.) or agricultural fiber, generally with resin under heat and pressure, to form a structural panel or engineered wood product. The processes at this wood pellet manufacturing plant do not utilize resin to form a structural panel or engineered wood product. The wood pellet process involves lignins which are naturally occurring in wood and which are released during the pelletizing process to create a bond.</p> <p>Regulatory review indicates there are no Area Source Standards for this source category.</p>
61-62.68	Not Applicable - This facility does not use or store any chemicals regulated by 112(r).
40 CFR 64 (CAM)	<p>In order for a pollutant specific emission unit (PSEU) to be subject to compliance assurance monitoring (CAM) the PSEU must meet the following criteria:</p> <ul style="list-style-type: none"> i. Be located at a major source for which a Part 70 or 71 permit is required ii. Be subject to an emission limitation or standard iii. Use a control device to achieve compliance iv. Have potential pre-control emissions of greater than 100 tons per year if a criteria pollutant or greater than 10/25 tons per year if a HAP and must not otherwise be exempt from CAM <p>CAM will be addressed during Title V permitting.</p>

Standard No. 1 Allowable

ID	PM Allowable (lb/hr)	SO ₂ Allowable (lb/hr)	Uncontrolled Emissions		Controlled Emissions	
			PM (lb/hr)	SO ₂ (lb/hr)	PM (lb/hr)	SO ₂ (lb/hr)
5 MM Btu/hr natural gas fired Dryer Duct Burner (E48)	3 (lb/hr)	11.5 (lb/hr)	0.04	2.94E-03	0.04	2.94E-03



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Standard No. 4 Allowable					
Process	Process Weight Rate (tons/hr)	PM Allowable (lb/hr)	Uncontrolled Emissions PM (lb/hr)	Controlled Emissions PM (lb/hr)	Monitoring
Debarker (P0/E1)	230	60.04	2.70	2.70	Work Practices
Electric Powered Chipper (P0/E2)	175	57.07	1.68 (process emissions)	1.68 (process emissions)	Work Practices
Green Wood Screening (P0/E3)	175	57.07	0.33	0.33	Work Practices
Pile Drop (P0/E4)	350	64.76	0.01	0.01	Work Practices
Storage Pile Wind Erosion (P0/E5)	350	64.76	0.65	0.65	Work Practices
Truck Dump 1 (P0/E46)	175	57.07	5.88E-03	5.88E-03	Work Practices
Truck Dump 2 (P0/E47)	175	57.07	5.88E-03	5.88E-03	Work Practices
Green Hammermill 1 (P1/E6)	435 (total)	67.29 (total)	256.77 (total)	2.57 (total)	Measurement of WESP Secondary Voltage (kV) and Current (mA) each shift PM missions will continue to be controlled by the existing Wet Electrostatic Precipitator (WESP)
Green Hammermill 2 (P1/E7)					
Green Hammermill 3 (P1/E8)					
Green Hammermill 4 (P1/E9)					
Green Hammermill 5 (P1/E58)					
Green Chip Silo (P1/E10)					
Furnace (P2/E11)					



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Standard No. 4 Allowable					
Process	Process Weight Rate (tons/hr)	PM Allowable (lb/hr)	Uncontrolled Emissions PM (lb/hr)	Controlled Emissions PM (lb/hr)	Monitoring
Dryer (P2/E12)					
Furnace Bypass (P2/E11)	85	49.62	24.27	24.27	Work Practices
Dry Chip Silo (P2/E13)	85	49.62	17.14	0.17	Work Practices
Vertical Dry Hammermill 1 through 36 (P3/E59 through E94)	96	50.87	1,506	15.06	Measurement of WESP Secondary Voltage (kV) and Current (mA) each shift PM missions will continue to be controlled by the existing Wet Electrostatic Precipitator (WESP)
Pelletizer 1 (P4/E20)	48 (total)	44.20 (total)	428.57 (total)	4.29 (total)	Pressure Differential (each shift)- Particulate Matter Emissions will continue to be controlled by the existing Baghouses (Cyclofilters)
Pelletizer 2 (P4/E21)					
Pelletizer 3 (P4/E22)					
Pelletizer 4 (P4/E24)					
Pelletizer 5 (P4/E25)					
Pelletizer 6 (P4/E26)					
Pelletizer 7 (P4/E28)					
Pelletizer 8 (P4/E29)					
Pelletizer 9 (P4/E30)					
Pellet Cooler 1 (P4/E23)					



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Standard No. 4 Allowable					
Process	Process Weight Rate (tons/hr)	PM Allowable (lb/hr)	Uncontrolled Emissions PM (lb/hr)	Controlled Emissions PM (lb/hr)	Monitoring
Pellet Cooler 2 (P4/E27)					
Pellet Cooler 3 (P4/E31)					
Pelletizer 10 (P4/E32)					Pressure Differential (each shift) - PM Emissions will continue to be controlled by the existing and new Baghouses (Cyclofilters)
Pelletizer 11 (P4/E33)					
Pelletizer 12 (P4/E34)					
Pelletizer 13 (P4/E36)					
Pelletizer 14 (P4/E37)					
Pelletizer 15 (P4/E38)	48 (total)	44.20 (total)	428.57 (total)	4.29 (total)	
Pelletizer 16 (P4/E49)					
Pelletizer 17 (P4/E50)					
Pelletizer 18 (P4/E51)					
Pellet Cooler 4 (P4/E35)					
Pellet Cooler 5 (P4/E39)					
Pellet Cooler 6 (P4/E52)					
Pellet Silo 1 (P5/E40)	96 (total)	50.87 (total)	17.14 (total)	0.17 (total)	
Pellet Silo 2 (P5/E41)					
Loadout (P5/E42)	150	55.44	98.57	0.99	Pressure Differential (each shift) - PM Emissions will continue to be controlled by



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Standard No. 4 Allowable					
Process	Process Weight Rate (tons/hr)	PM Allowable (lb/hr)	Uncontrolled Emissions PM (lb/hr)	Controlled Emissions PM (lb/hr)	Monitoring
					the existing Baghouses and existing Cyclone
Dust Silo (P5/E43)	5	12.05	28.29	0.28	Pressure Differential each shift PM Emissions will continue to be controlled by the existing Baghouse (Cyclofilter 7)

AMBIENT AIR STANDARDS REVIEW	
Regulations	Comments/Periodic Monitoring Requirements
Standard No. 2	This facility has demonstrated compliance through modeling; see modeling summary dated 04/02/2020
Standard No. 8 (state only)	This facility has demonstrated compliance through modeling; see modeling summary dated 04/02/2020

Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
E6-E9, E58, E10, E11, E12	Green Hammermill 1 - 5, Green Chip Silo, Furnace, Dryer	CO	0.18	lb/ODT	Uncontrolled	- Enviva Greenwood December 2018 Based on recent Enviva stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.
		NO _x	0.34	lb/ODT	Uncontrolled	
		PM/PM ₁₀ /PM _{2.5}	3.41	lb/ODT	Uncontrolled	
		VOC	2.49	lb/ODT	Uncontrolled	

Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
E6-E9, E58, E10, E11, E12	Green Hammermill 1 - 5, Green Chip Silo, Furnace, Dryer	Acetaldehyde	0.19	lb/ODT	Uncontrolled	- Wiggins October 2013 - Engineering judgement Recent Enviva stack testing for Greenwood did not measure detectable levels of this pollutant. Therefore, factor is based on test results for these emission sources at other Enviva facilities and engineering judgement. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.
		Acrolein	0.12	lb/ODT	Uncontrolled	- Greenwood (Colombo) October 3, 2017 - Wiggins October 2013 No Enviva testing available for Greenwood. Therefore, factor is based on Colombo test results for these emission



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Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
						sources at the Greenwood facility and testing at other Enviva facilities. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.
		Formaldehyde	0.12	lb/ODT	Uncontrolled	- Enviva Greenwood December 2018 Based on recent Enviva stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.
		Methanol	0.15	lb/ODT	Uncontrolled	- Sampson March 29, 2018 - Amory October 2013 - Engineering judgement Recent Enviva stack testing for Greenwood did not measure detectable levels of this pollutant. Therefore, factor is based on test results for these emission sources at other Enviva facilities and engineering judgement. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.
		Phenol	0.15	lb/ODT	Uncontrolled	- Greenwood (Colombo) October 3, 2017 - Engineering judgement No Enviva testing available for Greenwood. Therefore, factor is based on Colombo test results for these emission sources at the Greenwood facility and engineering judgement. Contingency (engineering judgement) was applied to account for stack testing variability.
		Propionaldehyde	5.62E-02	lb/ODT	Uncontrolled	- Wiggins October 2013 - Engineering judgement No testing available for Greenwood. Therefore, factor is based on test results for these emission sources at other Enviva facilities and engineering judgement. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.

Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
E14-E18, E59-E94	Dry Hammermills	VOC	1.23	lb/ODT	Uncontrolled	- Enviva Greenwood December 4-5, 2018 - Greenwood (Colombo) October 2-6, 2017 - Amory October 2013 - Wiggins October 2013 Enviva did not believe the Greenwood December 2018 stack test results alone were fully representative of VOC emission from these DHMs. Therefore, a higher



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Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
						factor was selected, which is based on inclusion of additional test results for these sources at Greenwood and other Enviva facilities. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability. - Enviva Greenwood December 2018
		PM/PM ₁₀ /PM _{2.5}	0.17	lb/ODT	Controlled	Based on recent stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.

Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
E14-E18, E59-E94	Dry Hammermills	Acetaldehyde	7.20E-03	lb/ODT	Uncontrolled	(Acetaldehyde) Wiggins October 2013 Recent Enviva stack testing for Greenwood did not measure detectable levels of this pollutant. Therefore, Acetaldehyde factor is based on test results for these emission sources at other Enviva facilities. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.
		Acrolein	1.08E-02	lb/ODT	Uncontrolled	(Acrolein) Enviva stack testing for Greenwood did not measure detectable levels of this pollutant. Therefore, Acrolein factor is based on test results for these emission sources at other Enviva facilities. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability
		Formaldehyde	2.40E-04	lb/ODT	Uncontrolled	- Enviva Greenwood December 2018
		Methanol	5.88E-03	lb/ODT	Uncontrolled	Based on recent stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.
		Phenol	2.76E-03	lb/ODT	Uncontrolled	- Engineering judgement Enviva stack testing for Greenwood did not measure detectable levels of this pollutant and no testing available for other plants. Therefore, factor is based on engineering judgement.
		Propionaldehyde	1.24E-02	lb/ODT	Uncontrolled	- Greenwood (Colombo) October 2017 No Enviva testing available for Greenwood. Therefore, factor is based on Colombo test results for these



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Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
						emission sources at the Greenwood facility. Contingency (engineering judgement) was applied to account for stack testing variability.

Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
E20-E39, E49-E52	Pelletizers and Pellet Coolers	VOC	2.97	lb/ODT	Uncontrolled	Based on recent stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.
		CO	0.11	lb/ODT	Uncontrolled	
		NO _x	1.80E-02	lb/ODT	Uncontrolled	
		PM _{2.5}	1.52E-02	lb/ODT	Controlled	

Emission Factors						
Emission Unit ID	Source Description	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Supporting Stack Tests and Justification
E20-E39, E49-E52	Pelletizers and Pellet Coolers	Acetaldehyde	3.36E-02	lb/ODT	Uncontrolled	- Enviva Greenwood January 2019 Based on recent stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.
		Acrolein	4.99E-02	lb/ODT	Uncontrolled	- Wiggins October 2013 - Greenwood (Colombo) October 2017 No Enviva testing available for Greenwood. Therefore, factor is based on Colombo test results for these emission sources at the Greenwood facility and testing at other Enviva facilities. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.
		Formaldehyde	0.13	lb/ODT	Uncontrolled	- Enviva Greenwood January 2019 Based on recent stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.
		Methanol	5.98E-03	lb/ODT	Uncontrolled	- Enviva Greenwood March 2019 Based on recent stack test results for the Greenwood plant. Contingency (engineering judgement) was applied to account for stack testing variability.
		Phenol	2.52E-02	lb/ODT	Uncontrolled	- Wiggins October 2013 Enviva stack testing for Greenwood did not measure detectable levels of this pollutant. Therefore, factor is



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						based on test results for these emission sources at other Enviva facilities. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.
						- Wiggins October 2013 - Greenwood (Colombo) October 2017
		Propionaldehyde	1.46E-02	lb/ODT	Uncontrolled	No Enviva testing available for Greenwood. Therefore, factor is based on Colombo test results for these emission sources at the Greenwood facility and testing at other Enviva facilities. Contingency (engineering judgement) was applied to account for stack testing and inter-plant variability.

Emission Unit ID	Source Description	Pollutant	Emission Rate	Controlled or Uncontrolled	Justification
E20-E39, E49-E52	Pelletizers and Pellet Coolers	Total PM	4.29 lb/hr	Controlled	Enviva relied on equipment vendor recommendations applied to actual flow rates to determine Pelletizer and Pellet Coolers, PM and PM ₁₀ emission rates. PM and PM ₁₀ emissions calculated using this methodology were higher than the results obtained during stack testing at the Greenwood plant PM ₁₀ speciation factors are based on engineering judgment and data from a similar Enviva facility.
		Total PM ₁₀	1.12 lb/hr	Controlled	
PM emissions based on an outlet grain loading of 0.01 gr/scf and an exhaust flow rate of 50,000 scfm. Per Vendor recommendations.					
PM ₁₀ emissions are based on PM emissions and speciation based on data for similar Enviva facility. (PM ₁₀ speciation) PM ₁₀ as a percentage of PM = 26%					
The initial PM and PM ₁₀ emissions rates for the Pelletizers and Pellet Coolers are based on baghouse flow rate (scfm) and outlet grain loading (gr/scf). These initial emission rates are based on equipment vendor recommendations and represent a more conservative emissions estimate than the EF which was determined during stack test (Enviva Greenwood January 2019)					

FUEL COMBUSTION EMISSIONS					
Furnace - Normal Operations - Biomass Combustion Emission Factors					
Fuel Type and Heat Input Capacity	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Justification
200 MM Btu/hr Clean untreated bark/wet wood chips	SO ₂	0.025	lb/MM Btu	Uncontrolled	SO ₂ emission factor is based on AP-42, Chapter 1, Section 1.6 - Wood Residue Combustion in Boilers, Table 1.6-1, for bark/bark and wet wood.

Furnace Bypass - Cold Start-Up - Biomass Combustion Emission Factors					
Fuel Type and Heat Input Capacity	Pollutant	EF	Units	Controlled or Uncontrolled	Justification



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				Factor?	
30 MM Btu/hr Clean untreated bark/ wet wood chips	PM	0.58	lb/MMBtu	Uncontrolled	Criteria pollutant emission factors are based on AP-42, Chapter 1, Section 1.6 - Wood Residue Combustion in Boilers, Table 1.6-1, for bark/bark and wet wood. Total PM, Total PM ₁₀ and Total PM _{2.5} factors equal to the sum of the filterable and condensable factors. VOC emission factor excludes formaldehyde. Formaldehyde EF = 4.4E-03 lb/MMBtu
	PM ₁₀	0.52	lb/MMBtu	Uncontrolled	
	PM _{2.5}	0.45	lb/MMBtu	Uncontrolled	
	VOC	0.017	lb/MMBtu	Uncontrolled	
	CO	0.60	lb/MMBtu	Uncontrolled	
	NO _x	0.22	lb/MMBtu	Uncontrolled	
	SO ₂	0.025	lb/MMBtu	Uncontrolled	

Furnace Bypass - Cold Start-Up - Diesel Fuel Emission Factors					
Fuel Type and Heat Input Capacity	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Justification
7 MM Btu / yr Diesel Fuel (15-30 gallons per start-up; up to 100 -200 gallons per year)	Total PM	3.3	lb/10 ³ gal	Uncontrolled	Criteria pollutant emission factors are based on AP-42, Chapter 1, Section 1.3 - Fuel Oil Combustion, distillate fuel oil, Table 1.3 - 1, Table 1.3-2, Table 1.3-3, Table 1.3-6 and are located in Appendix C, Table 5 of the Application. SO ₂ emissions, assume a 15 ppm sulfur content in diesel fuel
	Total PM ₁₀	3.3	lb/10 ³ gal	Uncontrolled	
	Total PM _{2.5}	3.3	lb/10 ³ gal	Uncontrolled	
	VOC	0.2	lb/10 ³ gal	Uncontrolled	
	CO	5	lb/10 ³ gal	Uncontrolled	
	NO _x	20	lb/10 ³ gal	Uncontrolled	
	SO ₂	0.2	lb/10 ³ gal	Uncontrolled	

Furnace Bypass - Idle Mode - Biomass Combustion Emission Factors					
Fuel Type and Heat Input Capacity	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Justification
Clean untreated bark/ wet wood chips 12 MM Btu/hr	PM	0.58	lb/MMBtu	Uncontrolled	Criteria pollutant emission factors are based on AP-42, Chapter 1, Section 1.6 - Wood Residue Combustion in Boilers, Table 1.6-1, for bark/bark and wet wood. Total PM, Total PM ₁₀ and Total PM _{2.5} factors equal to the sum of the filterable and condensable factors. VOC emission factor excludes formaldehyde. Formaldehyde EF = 4.4E-03 lb/MMBtu
	PM ₁₀	0.52	lb/MMBtu	Uncontrolled	
	PM _{2.5}	0.45	lb/MMBtu	Uncontrolled	
	VOC	0.017	lb/MMBtu	Uncontrolled	
	CO	0.60	lb/MMBtu	Uncontrolled	
	NO _x	0.22	lb/MMBtu	Uncontrolled	
	SO ₂	0.025	lb/MMBtu	Uncontrolled	

Dryer Duct Burner Emission Factors					
Fuel Type and Heat Input Capacity	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Justification
Natural Gas 5 MM Btu/hr	PM _{condensable}	5.70	lb/MMscf	Uncontrolled	Criteria pollutant emission factors are based on AP-42, Chapter 1, Section 1.4 - Natural Gas Combustion, Table 1.4-1, Table 1.4-2. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf
	PM _{10 condensable}	5.70	lb/MMscf	Uncontrolled	
	PM _{2.5 condensable}	5.70	lb/MMscf	Uncontrolled	
	PM _{filterable}	1.90	lb/MMscf	Uncontrolled	
	PM _{10 filterable}	1.90	lb/MMscf	Uncontrolled	
	PM _{2.5 filterable}	1.90	lb/MMscf	Uncontrolled	
	VOC	5.50	lb/MMscf	Uncontrolled	
	CO	84.0	lb/MMscf	Uncontrolled	
	NO _x	100.0	lb/MMscf	Uncontrolled	
	SO ₂	0.60	lb/MMscf	Uncontrolled	

Engine 1 - Generator Emission Factors					
Fuel Type and Engine Power	Pollutant	EF	Units	Controlled or	Justification



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				Uncontrolled Factor?	
Diesel Engine 1 - 865 hp (brake)	PM	1.8E-02	g/hp-hr	Uncontrolled	Criteria pollutant emission factors are based on Technical Data sheet for the engine. Sulfur content in accordance with Year 2010 standards of 40 CFR 80.510 (a) as required by 40 CFR 60 Subpart IIII
	PM ₁₀	1.8E-02	g/hp-hr	Uncontrolled	
	PM _{2.5}	1.8E-02	g/hp-hr	Uncontrolled	
	VOC	1.00E-02	g/hp-hr	Uncontrolled	
	CO	4.00E-01	g/hp-hr	Uncontrolled	
	NO _x	5.74	g/hp-hr	Uncontrolled	
	SO ₂	15	ppmv	Uncontrolled	

Engine 2 - Fire Pump Emission Factors					
Fuel Type and Engine Power	Pollutant	EF	Units	Controlled or Uncontrolled Factor?	Justification
Diesel Engine 2 - 305 hp (brake)	PM	0.15	g/hp-hr	Uncontrolled	PM, PM ₁₀ , PM _{2.5} , CO and NO _x emission factors based on 40 CFR 60 Subpart IIII (or 40 CFR 89.112 where applicable) in compliance with post-2009 construction. Sulfur content in accordance with Year 2010 standards of 40 CFR 80.510 (a) as required by Subpart IIII. VOC emission factor based on AP-42 Section 3.3, Tables 3.3-1, Table 3.3-2
	PM ₁₀	0.15	g/hp-hr	Uncontrolled	
	PM _{2.5}	0.15	g/hp-hr	Uncontrolled	
	VOC	2.51E-03	g/hp-hr	Uncontrolled	
	CO	2.60	g/hp-hr	Uncontrolled	
	NO _x	3.00	g/hp-hr	Uncontrolled	
	SO ₂	15	ppmv	Uncontrolled	

Initial PM emissions for the Pelletizers/Pellet Coolers
 Emissions (E) = [50,000 (scfm) x 0.01 (gr/scf) x 60 min/hour / 7,000 gr/lb] x operating hours x 1 ton / 2000 lb
 Baghouse flow rate (scfm) and outlet grain loading (gr/scf) are based on equipment vendor recommendations

Initial PM₁₀ emissions for the Pelletizers/Pellet Coolers
 Emissions (E) = [50,000 (scfm) x 0.01 (gr/scf) x 60 min/hour / 7,000 gr/lb] x operating hours x 1 ton / 2000 lb
 (PM₁₀ speciation) PM₁₀ as a percentage of PM = 26%
 Baghouse flow rate (scfm) and outlet grain loading (gr/scf) are based on equipment vendor recommendations

Initial PM, PM₁₀ and PM_{2.5} emissions from the Dry Chip Silo, Pelletizer Feed Silo, Pellet Silo 1, and Pellet Silo 2
 Emissions (E) = 2,000 (scfm) x 0.01 (gr/scf) x 60 min/hour / 7,000 gr/lb x operating hours x 1 ton / 2,000 lb
 Baghouse flow rate (scfm) and outlet grain loading (gr/scf) are based on vendor recommendations

Initial PM, PM₁₀ and PM_{2.5} emissions from Loadout
 Emissions (E) = 23,000 (scfm) x 0.005 (gr/scf) x 60 min/hour / 7,000 gr/lb x operating hours x 1 ton / 2,000 lb
 Baghouse flow rate (scfm) and outlet grain loading (gr/scf) are based on vendor recommendations



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Initial PM, PM ₁₀ and PM _{2.5} emissions from Dust Silo
Emissions (E) = 3,300 (scfm) x 0.01 (gr/scf) x 60 min/hour / 7,000 gr/lb x operating hours x 1 ton / 2,000 lb
Baghouse flow rate (scfm) and outlet grain loading (gr/scf) are based on vendor recommendations

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PUBLIC NOTICE

This construction permit(s) will undergo a 30-day public notice period, in accordance with SC Regulation 61-62.1, Section II.N and to establish synthetic minor limits for a plant-wide total wood pellet production limit of 660,000 oven dry short tons per year.

ADDITIONAL PUBLIC PARTICIPATION

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards

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