

**NORTH CAROLINA DIVISION OF
AIR QUALITY**

Application Review

Issue Date:

Region: Fayetteville Regional Office
County: Sampson
NC Facility ID: 8200152
Inspector's Name: Gregory Reeves
Date of Last Inspection: 03/29/2018
Compliance Code: B / Violation - emissions

Facility Data	Permit Applicability (this application only)
<p>Applicant (Facility's Name): Enviva Pellets Sampson, LLC</p> <p>Facility Address: Enviva Pellets Sampson, LLC 5 Connector Road, US 117 Faison, NC 28341</p> <p>SIC: 2499 / Wood Products, Nec NAICS: 321999 / All Other Miscellaneous Wood Product Manufacturing</p> <p>Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V</p>	<p>SIP: 02D .0515, 02D .0516, 02D .0521, 02D .0530, 02D .0540, 02D .1112</p> <p>NSPS: No NESHAP: 112(g) Case-by-Case MACT PSD: Yes PSD Avoidance: No NC Toxics: Yes 112(r): No Other: N/A</p>

Contact Data			Application Data
Facility Contact	Authorized Contact	Technical Contact	<p>Application Number: 8200152.18A Date Received: 03/19/2018 Application Type: Modification Application Schedule: PSD</p> <p style="text-align: center;">Existing Permit Data</p> <p>Existing Permit Number: 10386/R03 Existing Permit Issue Date: 04/07/2017 Existing Permit Expiration Date: 10/31/2019</p>
William Simon EHS Manager (910) 375-6365 5 Connector Road, US 117 Faison, NC 28341	Steven Schaar Plant Manager (757) 556-3454 5 Connector Road, US 117 Faison, NC 28341	Kai Simonsen Air Permit Engineer (919) 428-0289 4242 Six Forks Road, Suite 1050 Raleigh, NC 27609	

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2017	20.85	166.90	509.38	175.19	96.90	62.58	18.36 [Formaldehyde]
2016	4.73	38.01	73.26	39.81	18.63	9.10	4.46 [Methanol (methyl alcohol)]

<p>Review Engineer: Betty Gatano</p> <p>Review Engineer's Signature: _____ Date: _____</p>	<p style="text-align: center;">Comments / Recommendations:</p> <p>Issue 10386/R04 Permit Issue Date: _____ Permit Expiration Date: _____</p>
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1.0 Introduction and Purpose of Application

1.1 Facility Description & Proposed Change

Enviva Pellets Sampson, LLC (referred to as Enviva or the Sampson Plant throughout this document) currently holds Air Permit No. 10386R03 with an expiration date of October 31, 2019 for a wood pellets manufacturing plant near Faison in Sampson County, North Carolina. The plant began operation on October 3, 2016 and 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 consists of a log chipper, green wood hammermills, bark hog, wood-fired rotary dryer, dry hammermills, pellet presses and coolers, product loadout operations, and other ancillary activities.

This permit application is a Prevention of Significant Deterioration (PSD) permit modification for a proposed Softwood Expansion Project (SWEP). The SWEP is being implemented to meet new customer demands for increased softwood percentage and production rate and to incorporate emission reduction efforts to minimize emissions impacts associated with the project. The following summarizes the proposed physical changes and changes in the method of operation associated with the SWEP:

- Increase permitted production rate from 537,625 ODT per year to 657,000 ODT per year by upgrading pellet dies with a new prototype;
- Increase the amount of softwood processed from 75% to a maximum of 100%;
- Add a regenerative thermal oxidizer (RTO) (ID No. CD-RTO) following the current wet electrostatic precipitator (WESP) (ID No. CD-WESP) on the wood-fired direct heat drying system. The WESP and RTO will control volatile organic compound (VOC), hazardous air pollutants (HAP) and particulate matter (PM) emissions;
- Remove the green wood hammermill bin vents/baghouses and recirculate the exhaust directly to the WESP/RTO system (ID Nos. CD-WESP and CD-RTO) to reduce VOC, HAP and PM emissions;¹
- Install a baghouse (ID No. CD-PSTB-BH) to control the pellet sampling transfer bin (ID No. ES-PSTB) PM emissions. The emission source is currently controlled via a bin vent filter (ID No. CD-DC-BV-3);
- Install the eighth dry hammermill (ID No. ES-HM-8) with associated product recovery cyclone and baghouse (ID No. CD-HM-BH8). This emission source is already permitted but not yet installed;
- Decrease the amount of wood assumed to bypass the dry hammermills (ID Nos. ES-HM-1 to through ES-HM-8) from 25% to 15%; and
- Add dry shavings handling (ID No. IES-DRYSHAVE) and storage silo to allow the facility to process purchased shavings that will not require drying.

In addition to changes associated with SWEP, the permit application addresses the following:

- Update site emissions to reflect existing insignificant activities including:
 - Four green wood storage piles (ID Nos. IES-GWSP-1 through 4), which replace the currently permitted green wood storage pile 1 and 2 (ID Nos. IES-GWSP-1 and 2);

¹ Permit application no. 8200152.18A proposed to recirculate the exhaust from the green wood hammermills to either the inlet of the dryer or directly to the WESP/RTO system (ID Nos. CD-WESP and CD-RTO) to reduce VOC, HAP and PM emissions. Enviva subsequently decided to choose the latter control configuration.

- Green wood handling (ID No. IES-GHW) material transfer points (i.e., transfer of chips from trucks); and
- Bark fuel storage piles (ID No. IES-BFSP-1 and 2).
- Add additive handling and storage (ID No. ES-ADD);
- Incorporate a new baghouse (ID No. CD-HMC-BH) installed to control emissions from the dry hammermill conveying system (ID No. ES-HMC) previously approved by NCDAQ;
- Update to HAP emission factors to reflect new testing data from the Sampson plant and other similar Enviva facilities;
- Update the diesel-fired emergency generator (ID No. IES-EG) rating to the as-built rating of 689 brake horsepower (bhp) instead of the proposed 536 bhp unit referenced in the initial PSD application;
- Update bin vent filter (ID No. CD-BF) and bagfilter (ID No. CD-BF) descriptions, which have been changed to baghouses (ID No. CD-BHs) to more accurately reflect control equipment used at the Sampson plant; and
- Clarify the use of the cyclones on the dry hammermills (ID No. ES-HM-1 to 8) and dryer (ID No. ES-DRYER). These cyclones are not used as air pollution control devices but rather are used for product recovery and, therefore, will be removed from the control device description in Section 1 of the Sampson plant’s permit.

The permit application is being submitted as a PSD modification. Per 15A NCAC 02D .0530(r), the permit application shall be processed in accordance with the public participation procedures and requirements of 40 CFR 51.166(q). The draft permit will be sent out for public comment for a period of 30 days (to the Region, the US Environmental Protection Agency (US EPA), local newspaper, applicant, affected states, local city/county executives, and FLM as necessary). The NCDAQ Director has also determined a public hearing for this permit application is in the best interest of the public, and a public hearing will be held for the draft permit.

1.2 Plant Location

Enviva is located at 5 Connector Road, US 117, Faison, North Carolina, which is in northeastern Sampson County. Sampson County has been classified as in attainment for all pollutants subject to a National Ambient Air Quality Standard (NAAQS).

1.3 Permitting History

Permit	Date	Description
10386R00	November 17, 2014	Air Permit No. 10386R00 was issued for a greenfield facility to manufacture wood pellets in Sampson County. The proposed plant was designed to produce up to 537,625 ODT of wood pellets per year utilizing up to 75% softwood on a 12-month rolling total basis. The facility is PSD major, with the incorporation of applicable BACT limits in the permit.
10386R01	January 6, 2015	Air Permit No. 10386R01 was issued as an administrative amendment to correct the Regional Supervisor/Office listed in General Condition 1 in the permit.

Permit	Date	Description
10386R02	January 27, 2016	Air Permit No. 10386R02 was issued as a “Part 1” of a two-step significant modification under 15A NCAC 02Q .0501(b)(2). The following changes were made under this permit: <ul style="list-style-type: none"> • Added a third green wood hammermill (ID No. ES-GHM-3) controlled by a bagfilter (ID No. CD-GHM-BF-3), • Added a pellet sampling transfer bin (ID No. ES-PSTB) controlled by a bin vent filter (ID No. CD-DC-BV-3), • Added pellet cooler recirculation (ID No. ES-PCR) controlled by a bin vent filter (ID No. CD-PCR-BV), • Modified the emergency engine (ID No. IES-EG) and fire water pump engine (ID No. IES-FWP) to 536 horsepower and 131 horsepower, respectively, • Increased throughput through the green wood hammermills, and • Updated prior air dispersion modeling analysis to reflect the updated design of the facility.
10386R03	April 7, 2017	Air Permit No. 10386R03 was issued as an administrative amendment to add General Condition 17, “General Emissions Testing and Reporting Requirement,” to the permit. This condition was inadvertently left out in the previous revision.
--	September 29, 2017	Permit application no. 8200152.17B for an initial Title V permit was received. This permit application will be processed separately from the PSD permit application 8200152.18A.
10386R03	September 21, 2018	Special Order by Consent (SOC) 2018-003 became effective on September 21, 2018. The SOC addressed exceedance of the Best Available Control Technology (BACT) limit for VOCs from the dryer. Enviva intends to install an RTO on the dryer prior to permit issuance. The SOC provides activities and milestones Enviva must meet until the PSD permit is issued.
SOC 2018-003	December 14, 2018	Installation of the RTO was completed on December 14, 2018.

1.4 Application Chronology

Date	Event
November 21, 2017	Pre-application meeting between NCDAQ and Enviva occurred.
March 19, 2018	PSD permit application received.
March 23, 2018	A permit application acknowledgment letter was issued indicating the permit application was incomplete for processing because the required permit fee was not received in full.
April 3, 2018	The remainder of the permit fee was received, at which point the permit application was deemed administratively complete for processing.
April 3, 2018	A letter was issued to Enviva indicating the application was deemed complete for PSD processing. This does not preclude the NCDAQ from requesting additional information to process the Air Permit.
April 3, 2018	A copy of permit application and air modeling was forwarded to US EPA Region 4.

Date	Event
April 5, 2018	Kevin Godwin, Permitting Engineer, forwarded an e-mail to Michael Carbon, consultant for Enviva, requesting additional information on the PSD permit application.
April 19, 2018	Enviva submitted a letter response to the information request.
May 9, 2018	Tom Anderson of the Air Quality Analysis Branch (AQAB) of NCDAQ e-mailed personnel from US Forest Service, the Fish and Wildlife Services, and the National Park Service informing them of the project. No response from any of these agencies has been received to date.
June 6, 2018	An addendum to the permit application was received via e-mail.
July 6, 2018	NCDAQ issued an additional information request letter to Enviva regarding emission testing, BACT analysis, and air modeling.
July 23, 2018	Nancy Jones of the AQAB issued a memorandum approving the air modeling submitted in support of the permit application.
July 25, 2018	Enviva submitted a letter response to the information request dated July 6, 2018.
August 2, 2018	The permit application was reassigned to Betty Gatano.
August 16, 2018	Nancy Jones issued a revised memorandum approving the air modeling. The air modeling was resubmitted on August 5, 2018 to ensure it corresponded with the modeling results contained in the permit addendum.
August 22, 2018	Conference call with Enviva on questions regarding BACT analysis and emission references.
August 27, 2018	Betty Gatano e-mailed Mike Carbon and Aubrey Jones, consultants for Enviva, to discuss additional questions on emission calculations and the BACT analyses and emission calculations.
September 17, 2018	Betty Gatano, Mike Carbon and Aubrey Jones discussed the questions via conference call. After the call, some issues remained and Enviva's consultants indicated they would provide an e-mail to address outstanding issues.
October 5, 2018	Betty Gatano received response from Enviva's consultants.
October 10, 2018	Draft permit and permit review forwarded to the NCDAQ staff for comments.
October 15, 2018	FRO received a letter dated October 10, 2018 from Enviva notifying the region that Enviva planned to recirculate exhaust from green wood hammermills through the dryer and the WESP (ID Nos. CD-WESP) and the RTO (ID No. CD-RTO), which was under construction at the time. This configuration was proposed in the permit application (8200152.18A).
October 17, 2018	Comments received from Steve Hall, Chief of the Technical Services Section of the NCDAQ and Greg Reeves of the Fayetteville Regional Office.
October 24, 2018	Comments received from Mark Cuilla, Permitting Supervisor.
October 26, 2018	Betty Gatano e-mailed Michael Carbon questions based on comments received on the draft permit and permit review. Mr. Carbon responded via e-mail on October 30, 2018.
October 30, 2018	Comments received from Booker Pullen, Permitting Supervisor, and Heather Carter, Supervisor of the FRO.
November 5, 2018	Second draft forwarded for internal review.
November 29, 2018	Betty Gatano called Kai Simonsen of Enviva to discuss how emission testing at Enviva facilities were used to develop emission factors for the Sampson facility. Mr. Simonsen provided detailed information in an e-mail dated December 5, 2018.

Date	Event
December 2018	Comments on the draft permit were focused primarily on the testing conditions. NCDAQ staff meet internally several times to discuss and revise the PSD testing condition.
December 17, 2018	Draft of permit and permit review forwarded to the Permittee for comments.
January 4, 2019	Enviva submitted initial comments on the draft permit and permit review.
January 18, 2019	NCDAQ met with Enviva to discuss the draft Sampson permit.
February 2, 2017	Enviva submitted revised comments on the draft permit and permit review. Enviva also submitted a letter dated February 1, 2019 discussing why reevaluation of the 112(g) Case-by-Case MACT for this facility was not applicable.
March 1, 2019	NCDAQ issued a letter to Enviva requiring a reconsideration of the 112(g) Case-by-Case MACT analysis on the pellet coolers and presses.
March 21, 2019	Alan McConnell, attorney for Enviva, submitted a letter on behalf of Enviva in response to the 112(g) reconsideration letter.
May 1, 2019	NCDAQ staff conduct a site visit to the Sampson facility.
May 3, 2019	Betty Gatano discussed issues that arose from the site visit with Michael Carbon.
May 10, 2019	Michael Carbon submitted a letter addressing questions that arose from the May 1, 2019 site visit at Sampson.
May 17, 2019	Revised draft of permit and permit review forwarded to the Permittee for comments.
May 23, 2019	FRO received a letter dated May 23, 2019 from Enviva requesting approval to modify the controls for the green wood hammermills during the planned shut down in July 2019. Exhaust from the green wood hammermills will be recirculated directly into the new WESP/RTO control system (ID Nos. CD-WESP and CD-RTO).
May 31, 2019	Enviva submitted comments on the revised draft permit and permit review.
May 31, 2019	A settlement agreement resolving the dispute between Enviva and NCDAQ regarding the 112(g) Case-by-Case MACT analysis on the pellet coolers and presses was signed.

2.0 Modified Emission Sources and Emissions Estimates

All emission sources at Enviva will potentially be impacted by the SWEP, with the exception of the emergency generator, fire water pump, and associated diesel fuel storage tanks. Equipment, process changes, emissions associated with this PSD modification are discussed in this section. Figure 1 below provides a schematic of the wood pellets manufacturing process at Enviva after completion of the SWEP.

2.1 Emission Sources

Green Wood Handling and Storage

“Green” (i.e., wet) wood is delivered to the plant via trucks as either pre-chipped wood or bark or unchipped logs. Purchased chips and bark are unloaded from trucks into hoppers. From the hoppers the chips and bark are fed to conveyors (ID No. IES-GWH) that transfer the material to green wood storage piles (ID Nos. IES-GWSP-1 through 4) or to bark fuel storage piles (ID Nos. IES-BFSP-1 and 2), as appropriate. Conveyors transferring green wood chips are enclosed.

Purchased chips are screened and oversized chips undergo additional chipping as needed prior to transfer to the green wood storage piles.

Debarking, Chipping, Bark Hog, and Bark Fuel Storage Piles and Bin

Unchipped logs are first debarked by the electric-powered rotary drum debarker (ID No. IES-DEBARK-1) and then sent to the chipper (ID No. IES-CHIP-1), which chips the wood to specification for drying. Bark generated from the debarker is transferred via conveyor to the bark hog (ID No. IES-BARKHOG) for further processing.

Purchased bark and bark generated onsite are transferred to the bark fuel storage piles (ID Nos. IES-BFSP-1 and 2) via conveyor. The primary bark fuel storage pile (ID No. IES-BFSP-1) is located under a covered structure. The secondary bark fuel storage pile (ID No. IES-BFSP-2) serves as overflow storage as needed. Following storage in the bark fuel storage piles, the bark is transferred via a walking floor, to a covered conveyor, and finally to a fully enclosed bark fuel bin (ID No. IES-BFB) where the material is pushed into the dryer furnace.

Green Wood Hammermills

Chipped wood is further processed in the green wood hammermills (ID No. ES-GHM-1, ES-GHM-2, and ES-GHM-3) to reduce material to proper size. Emissions from the green wood hammermills are currently recirculated through the dryer and the new WESP/RTO control system (ID Nos. CD-WESP and CD-RTO). During the planned July 2019 shutdown, Enviva will recirculate the vent streams directly into the new WESP/RTO control system (ID Nos. CD-WESP and CD-RTO) to control PM, VOC, and HAP emissions.

Dryer

The wood-fired direct heat drying system (ID No. ES-DRYER) (aka “the dryer” throughout this document) consists of a furnace and single rotary dryer, which is used to reduce the moisture content of processed green wood chips to a desired level. The direct contact heat is provided to the system via a 250.4 million British thermal unit per hour (MMBtu/hr) total heat input furnace burner system. Fuel for the furnace consists of self-generated and purchased bark; purchased fuel chips (lower grade than chips that are used in the pelletizing process) and off-specification raw material chips; thermally/ mechanically processed intermediate off-specification raw material; and off-specification wood pellets.

Wood from the dryer is routed to four (4) identical product recovery cyclones operating in parallel, which capture dried wood for further processing. The current permit (Air Permit No. 10386R03) describes these cyclones as control devices, and these descriptions will be removed as part of this permit modification. Emissions from the dryer cyclones are combined into a common duct and routed to the existing WESP (ID No. CD-WESP) for PM and metallic HAP removal. As part of this project, a propane/natural gas-fired RTO (ID No. CD-RTO) will be added following the existing WESP to provide further control of PM, VOC, and HAP emissions.

The furnace and rotary dryer both have bypass stacks used to exhaust hot gases for temperature control during start-ups, shutdowns, and malfunctions. Specifically, the furnace bypass stack is used for cold startups, malfunctions, and planned shutdowns, while the dryer bypass is used during malfunction and planned shutdowns.

Use of the furnace bypass stack for cold start-ups and shutdowns will be limited to 50 hours per year. The furnace may also operate in “idle mode” with emissions routed to the furnace bypass stack. The

purpose of operation in “idle mode” is to maintain the temperature of the fire brick lining the furnace which may be damaged if it cools too rapidly. Operation in “idle mode” also significantly reduces the amount of time required to restart the dryers. The furnace may operate up to 500 hours per year in “idle mode,” which is defined as operation up to a maximum heat input rate of 5 MMBtu/hr.

Dried Wood Handling

Dried materials from the dryer product recovery cyclones are conveyed to screening operations to remove smaller wood particles. These smaller particles are diverted to the dry hammermill discharge conveyor, while oversized wood is sent to the dry hammermills (ID Nos. ES-HM-1 through 8) for further size reduction prior to pelletization. As part of the SWEP, Enviva is proposing to reduce the amount of material that will bypass the dry hammermills from 25% to 15%. Dust generated from transfer operations around the screening operation is diverted to the dry hammermill area filtration system (ID No. ES-HMA) controlled by a baghouse (ID No. CD-PCHP-BH).

Several other conveyor transfer points located between the dryer and dry hammermills comprise the emission source collectively called dry wood handling (ID No. ES-DWH). This handling system is completely enclosed with two (2) emission points that are controlled by individual baghouses (ID Nos. CD-DWH-BH-1 and 2).

As part of the SWEP, Enviva is proposing to use purchased dry shavings to produce wood pellets. Because the purchased shavings will not require drying, they will not produce any VOC and HAP emissions from the drying process. 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 (ID No. IES-DRYSHAVE). From the silo, the dry shavings will then be transferred via an enclosed screw conveyor to the dry hammermills for additional processing.

Dry Hammermills

Prior to pelletization, dried wood is reduced to the appropriate size using seven (7) existing dry hammermills operating in parallel (ID Nos. ES-HM-1 through ES-HM-7). Each dry hammermill includes a product recovery cyclone for capturing hammered wood for further processing. The current permit (Air Permit No. 10386R03) describes these cyclones as control devices, and these descriptions will be removed as part of this permit modification. PM emissions from each existing dry hammermill are controlled via one of the seven (7) individual baghouses (ID Nos. CD-HM-BH-1 through 7). Enviva will install an eighth dry hammermill (ID No. ES-HM-8) with associated product recovery cyclone and baghouse (ID No. CD-HM-BH8) as part of the SWEP. The eighth dry hammermill and associated controls have already been permitted.

Pellet Mill Feed Silo

Sized wood from the dry hammermill product recovery cyclones is transported by a set of conveyors to the pellet mill feed silo (ID No. ES-PMFS) prior to pelletization. PM emissions from the pellet mill feed silo are controlled by a baghouse (ID No. CD-PMFS-BH).

The conveyors from the product recovery cyclones to the pellet mill feed silo are referred to as the dry hammermill conveyors (ID Nos. ES-HMC), and emissions from these conveyors are controlled by a baghouse (ID NO. CD-HMC-BH).

Hammermill Area

An induced draft fan is used to transfer dust generated from several enclosed transfer/handling sources around the dry hammermill area (ID No. ES-HMA) to the pellet cooler high-pressure fines relay system (ID No. ES-PCHP) controlled by a baghouse (ID No. CD-PCHP-BH). Sources controlled by this baghouse include, but are not limited to, the following:

- Dry hammermill infeed and distribution transfer;
- Dry hammermill cyclone and baghouse drop out;
- Pellet cooler transfer (PM emissions from pellet cooler cyclones large enough to drop out of entrainment) and pellet screening;
- Dry hammermill pre-screen feeder emissions;
- Pellet screen fines cyclone; and
- Pellet fines relay system emissions.

Additive Handling

A dry powder additive is used in the pellet production process to increase the durability of the final product. The powder is added to sized wood from the dry hammermills prior to transfer to the pellet presses. The dry powder contains no hazardous chemicals or VOC materials.

Bulk additive material will be delivered by truck and pneumatically unloaded into a storage silo (ID No. ES-ADD) equipped with a baghouse (ID No. 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 that transfers milled wood to the pellet presses.

Pellet Press System and Pellet Coolers

Sized wood from the dry hammermills and dry fines collected from the pellet cooler HP fines relay system are mechanically compacted through pellet presses. Enviva has twelve (12) pellet presses at the facility. Exhaust from the pellet press system and pellet press conveyors are vented through the cooler aspiration cyclones and then to the atmosphere. No resin or other chemical binding agents are needed for pelletization. As part of the SWEP, Enviva is proposing to increase the permitted production rate from 537,625 ODT per year to 657,000 ODT per year by upgrading the pellet dies with a new prototype.

Heat is generated by compressing the pellets, and formed pellets are discharged into one of six (6) pellet coolers (ID Nos. ES-PCLR-1 through ES-PCLR-6) (i.e., two presses per cooler). Cooling air is passed through the pellets. The pellets contain a small amount of wood fines that are entrained in the cooling air and are controlled using six (6) cyclones (ID Nos. CD-CLR-1 through CD-CLR-6) operating in parallel prior to discharge to the atmosphere. Exhaust from the coolers are recirculated through the pellet cooler low pressure (LP) fines relay system (ID No. ES-PCLP), which is controlled by a baghouse (ID No. CD-PCLP-BH) that collects the fines from the cyclones to be reused in the process.

Pelletized wood is transferred from the pellet coolers to the truck loadout operation via a conveyor. PM emissions from conveyor are controlled by a baghouse (ID No. CD-PSTB-BH) on the pellet sampling transfer bin (ID Nos. ES-PSTB).

Finished Product Handling and Loadout

Final product is conveyed to four (4) pellet loadout bins (ID Nos. ES-PB-1 through ES-PB-4) that feed the two (2) truck loadout stations (ID Nos. ES-PL-1 and ES-PL-2). At both truck loadout stations, pellets are gravity fed into trucks through a covered chute that automatically telescopes upward during the loadout process to maintain constant contact with the product while loading to prevent fugitive PM emissions. Atmospheric emissions from pellet loadout are minimal because dried wood fines have been removed in the pellet screener, and a slight negative pressure is maintained in the loadout building as a fire prevention measure to prevent any buildup of dust on surfaces within the building. Slight negative pressure is produced via an induced draft fan that exhausts to the finished product handling baghouse (ID No. CD-FPH-BH). This baghouse controls emissions from finished product handling, which encompasses the pellet loadout bins (ID Nos. ES-PB-1 through ES-PB-4) and truck loadout operations (ID Nos. ES-PL-1 and ES-PL-2). Trucks are covered immediately after loading.

Emergency Generator, Fire Water Pump, and Diesel Fuel Storage Tanks

The plant currently has a 689 bhp diesel-fired emergency generator (ID No. IES-EG) and a 131 bhp diesel-fired fire water pump engine (ID No. IES-FWP). Aside from maintenance and readiness testing, the generator and fire water pump engines are only used for emergency operations.

Diesel for the emergency generator is stored in a tank of up to 2,500 gallons capacity (ID No. IES-TK-1) and diesel for the fire water pump is stored in a storage tank of up to 1,000 gallons capacity (ID No. IES-TK-2). A third diesel storage tank (ID No. IES-TK-3) with a capacity of 2,500 gallons is also located on-site.

The emergency generator, the fire water pump, and associated diesel fuel tanks will not be affected by the SWEP.

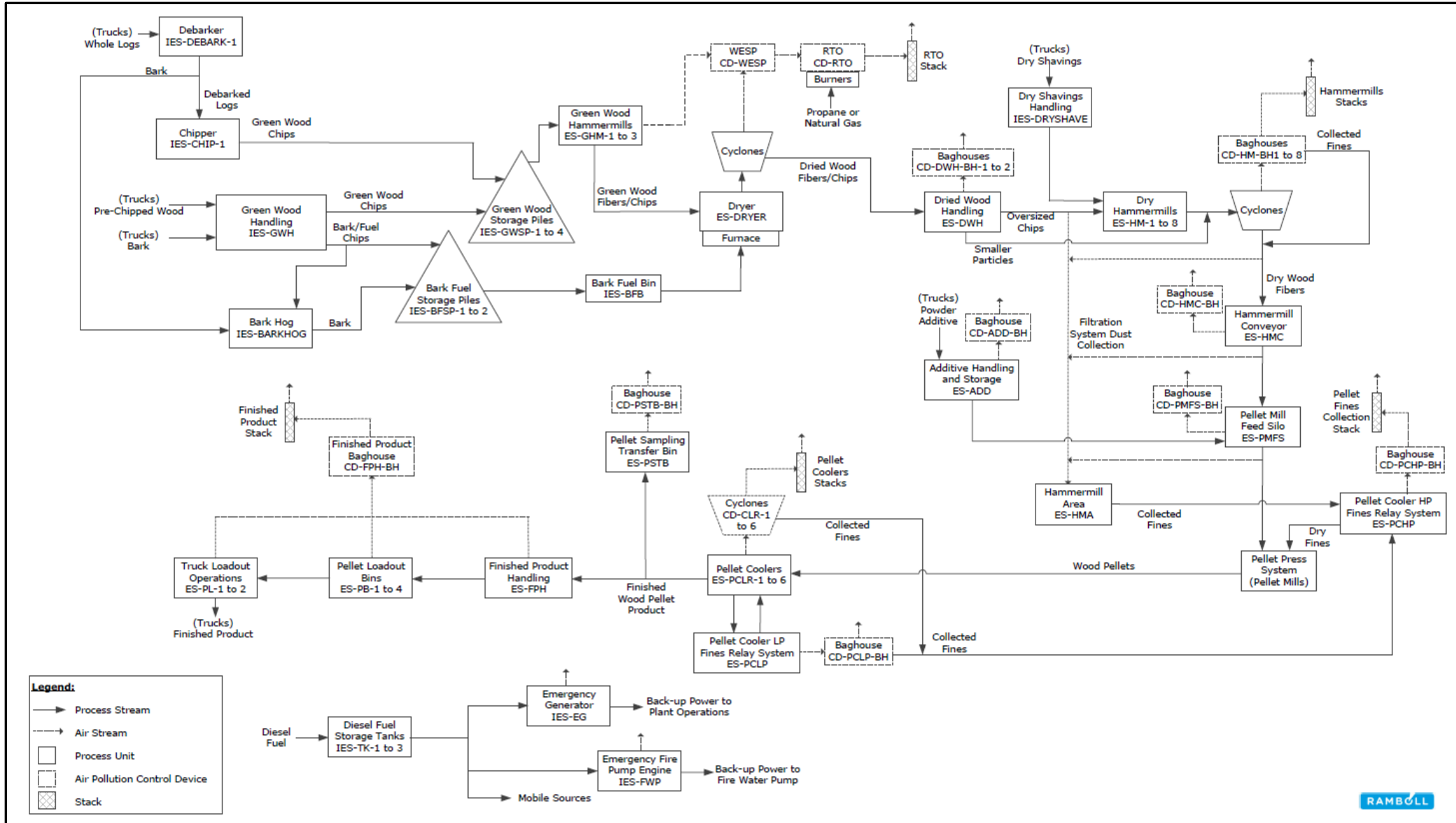


Figure 1. Process Flow Diagram of Pellet Manufacturing at Enviva

2.2 Emissions Associated with the Softwood Expansion Project

Emissions resulting from the proposed SWEP were reviewed to determine if the project is considered a major modification under PSD rules. All emission sources at Enviva are potentially impacted by the SWEP, with the exception of the emergency generator (ID No. IES-EG), the emergency fire water pump (ID No. IES-FWP), and the associated diesel fuel tanks. Emissions from these sources were excluded from review. Emissions from all other sources, as well as the proposed RTO (ID No. CD-RTO), were reviewed to determine PSD applicability.

Enviva assessed the applicability of PSD by performing a comparison test of baseline actual emissions (BAE) to potential emissions of the SWEP. Per 40 CFR 50.166(b)(7)(i), emission units that have existed for less than 2 years from the date of initial operation are, by definition, new emission units. Regulation 15A NCAC 02D .0530(b)(1)(B) specifies the following regarding BAE at new emission units:

“For a new emission unit, the baseline actual emissions for purposes of determining the emissions increase that will result from the initial construction and operation of such unit shall equal zero and thereafter, for all other purposes, shall equal the unit’s potential to emit.”

Because Enviva began operation at the Sampson plant in October of 2016 and has been in operation for less than two years when this PSD permit application was submitted, the BAE for all project-impacted emission units are equal to the potential to emit, as originally permitted. The BAE for the SWEP are provided in Table 1 below.

Calculation of the potential emissions from the project are provided in Appendix C of the PSD permit application, and the SWEP emissions are summarized in Table 1 below. The increases in emissions associated with the SWEP were compared with the PSD significant emission rates (SER) for each PSD regulated pollutant to determine if the modification was major under PSD. As shown in the table, the emission increases exceed the SERs only for emissions of VOC and PM, and BACT analyses were conducted for these two pollutants.

Pollutant	Baseline Actual Emissions (tpy)	Potential Project Emissions (tpy)	Emission Increase after Modification (tpy)	PSD Significant Threshold (tpy)	PSD Significant Modification? (Yes/No)
CO	230	219	-11	100	No
NO _x	219	219	-0.4	40	No
PM	169	239	70	25	Yes
PM ₁₀	106	106	-0.1	15	No
PM _{2.5}	62	43	-20	10	No
SO ₂	27.4	27.4	0	40	No
VOCs	627	840	214	40	Yes
CO ₂ e	229,828	256,230	26,402	75,000	No

Notes:

- Emissions include all emission sources except for emergency engines (ID Nos. IES-EG and IES-FWP) and associated diesel fuel tanks. These emission sources are not impacted by the SWEP.
- Baseline emissions are based on potential emissions as provided in previous Enviva Sampson PSD applications dated August 2014 and October 2015.

Table 1. Emissions Associated with the SWEP					
Pollutant	Baseline Actual Emissions (tpy)	Potential Project Emissions (tpy)	Emission Increase after Modification (tpy)	PSD Significant Threshold (tpy)	PSD Significant Modification? (Yes/No)
<ul style="list-style-type: none"> • Emissions for SWEP based on the following: <ul style="list-style-type: none"> ○ Emission factors developed, in part, from emission testing at other Enviva facilities. ○ Production rate of 657,000 ODT. ○ Maximum of 100% softwood processed. ○ Bypass of the dry hammermill estimated at 15%. ○ Control efficiency of the RTO estimated at 95% control of VOC. • Detailed emission calculations are provided Appendix C of Air Permit Application No. 8200152.18A. • CO₂ equivalent is defined as the sum of individual greenhouse gas pollutant emission times their global warming potential, converted to metric tons. 					

Table 2 below provides facility-wide emissions of criteria pollutants and greenhouse gases (GHGs) after the SWEP modification for all emission sources at Enviva, while Table 3 below provides facility-wide HAP emissions. As shown in Table 3, Enviva remains a major source of HAP emissions after the SWEP modification and installation of the RTO on the dryer and green wood hammermills, which will be rerouted to the WESP/RTO control system. Detailed emission calculations for each of these sources are provided in Appendix C of the permit application, and methodology for developing emission factors are discussed in Section 2.3 below.

Table 2. Facility-Wide Emissions after the SWEP Modification

Emission Unit ID	Source Description	Control Device ID	Control Device Description	CO (tpy)	NO _x (tpy)	PM (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	VOC (tpy)	CO ₂ e (tpy)
IES-CHIP-1	Log Chipping	--	--	--	--	--	--	--	--	1.6	--
IES-BARKHOG	Bark Hog	--	--	--	--	0.24	0.13	0.13	--	0.30	--
ES-DRYER	250.4 MMBtu/hr wood-fired direct heat drying system	CD-WESP CD-RTO	WESP; RTO	219	219	33	33	33	27	51	256,230
ES-GHM-1 through 3	Three (3) Green Wood Hammermills	CD-WESP CD-RTO	WESP; RTO								
ES-HM-1 through 8	Eight (8) Dry Hammermills	CD-HM-BH1 through 8	Eight (8) baghouses	--	--	18	18	0.31	--	168	--
ES-HMC	Hammermill Conveying System	CD-HMC-BH	One (1) baghouse	--	--	0.23	0.23	0.23	--	--	--
ES-HMA	Hammermill Area	CD-PCLP-BH	One (1) baghouse	--	--	0.47	0.47	0.47	--	--	--
ES-PCLP	Pellet Cooler LP Fines Relay System										
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BH	One (1) baghouse	--	--	0.37	0.37	0.37	--	--	--
ES-CLR-1 through 6	Six (6) Pellet Coolers	CD-CLR-1 through 6	Six (6) simple cyclones (one on each cooler)	--	--	151	39	4.8	--	572	--
ES-PCHP	Pellet Cooler HP Fines Relay System	CD-PCHP-BH	One (1) baghouse	--	--	0.15	0.15	0.15	--	--	--
ES-PSTB	Pellet Sampling Transfer Bin	CD-PSTB-BH	One (1) baghouse	--	--	0.15	0.15	0.15	--	--	--
ES-FPH	Finished Product Handling	CD-FPH-BH	One (1) baghouse	--	--	1.3	1.2	0.02	--	--	--
ES-PB-1 through 4	Four (4) Pellet Loadout Bins										
ES-PL-1 and 2	Two (2) Pellet Mill Loadouts										
ES-DWH	Dried wood handling operations	CD-DWH-BH-1 through -2	Two (2) baghouses	--	--	0.30	0.30	0.30	--	41	--
ES-ADD	Additive Handling and Storage	CD-ADD-BH	One (1) baghouse	--	--	0.15	0.15	0.15	--	--	--
IES-GWH	Green wood handling operations	--	--	--	--	0.08	0.04	0.006	--	--	--
IES-TK-1	2,500 gal diesel storage tank	--	--	--	--	--	--	--	--	0.001	--
IES-TK-2	500 gal diesel storage tank	--	--	--	--	--	--	--	--	0.0002	--
IES-TK-3	3,000 gal diesel storage tank	--	--	--	--	--	--	--	--	0.002	--
IES-GWSP-1 through 4	Green wood storage piles	--	--	--	--	15	7.7	1.2	--	6.9	--
IES-BFSP-1 and 2	Bark fuel storage piles	--	--	--	--	0.64	0.32	0.05	--	0.29	--
IES-DRYSHAVE	Dry shavings material handling	--	--	--	--	0.05	0.03	0.004	--	--	--
IES-DEBARK-1	Debarker	--	--	--	--	1.1	0.62	0.62	--	--	--
IES-BFB ¹	Bark fuel bin	--	--	--	--	--	--	--	--	--	--
IES-EG	689 hp diesel-fired emergency generator	--	--	0.18	1.5	0.019	0.019	0.019	0.0019	0.02	195
IES-FWP	131 hp diesel-fired fire water pump	--	--	0.07	0.18	0.009	0.009	0.009	0.0005	0.01	50
--	Paved Roads	--	--	--	--	16	3.3	0.80	--	--	--
Total Emissions:				219	221	239	106	43	27	840	256,475

Table 3. Facility-Wide Emissions of HAPs after the SWEP Modification

Pollutant	RTO ¹ (tpy)	ES-HM-1 through 8 (tpy)	ES-CLR-1 through 6 (tpy)	IES-EG (tpy)	IES-FWP (tpy)	ES-DWH (tpy)	IES-CHIP-1 (tpy)	IES- BARKHOG (tpy)	Total HAP (tpy)
Acetaldehyde	1.9	2.5	2.8	9.2E-04	1.8E-04	--	--	--	7.2
Acetophenone	1.8E-07	--	--	--	--	--	--	--	1.8E-07
Acrolein	1.1	3.0	17	1.1E-04	2.1E-05	--	--	--	21
Antimony & Compounds	6.3E-04	--	--	--	--	--	--	--	6.3E-04
Arsenic & Compounds	1.8E-03	--	--	--	--	--	--	--	1.8E-03
Benzo(a)pyrene	1.4E-04	--	--	2.3E-07	4.3E-08	--	--	--	1.4E-04
Benzene	0.33	--	--	1.1E-03	2.1E-04	--	--	--	0.33
Beryllium metal	8.9E-05	--	--	--	--	--	--	--	8.9E-05
Butadiene, 1,3-	--	--	--	4.7E-05	9.0E-06	--	--	--	5.6E-05
Cadmium Metal	4.8E-04	--	--	--	--	--	--	--	4.8E-04
Carbon tetrachloride	2.5E-03	--	--	--	--	--	--	--	2.5E-03
Chlorine	0.87	--	--	--	--	--	--	--	0.87
Chlorobenzene	1.8E-03	--	--	--	--	--	--	--	1.8E-03
Chloroform	1.5E-03	--	--	--	--	--	--	--	1.5E-03
Chromium VI	2.8E-04	--	--	--	--	--	--	--	2.8E-04
Chromium-Other compds	1.6E-03	--	--	--	--	--	--	--	1.6E-03
Cobalt compounds	5.3E-04	--	--	--	--	--	--	--	5.3E-04
Dichlorobenzene	1.6E-04	--	--	--	--	--	--	--	1.6E-04
Dichloroethane, 1,2-	1.6E-03	--	--	--	--	--	--	--	1.6E-03
Dichloropropane, 1,2-	1.8E-03	--	--	--	--	--	--	--	1.8E-03
Dinitrophenol, 2,4-	9.9E-06	--	--	--	--	--	--	--	9.9E-06
Di(2-ethylhexyl)phthalate	2.6E-06	--	--	--	--	--	--	--	2.6E-06
Ethyl benzene	1.7E-03	--	--	--	--	--	--	--	1.7E-03
Formaldehyde	1.2	2.2	10	1.4E-03	2.7E-04	0.28	--	--	14
Hexane	0.25	--	--	--	--	--	--	--	0.25
Hydrochloric acid	2.1	--	--	--	--	--	--	--	2.1
Lead and Lead Compounds	3.9E-03	--	--	--	--	--	--	--	3.9E-03
Manganese & Compounds	0.13	--	--	--	--	--	--	--	0.13
Mercury, vapor	3.1E-04	--	--	--	--	--	--	--	3.1E-04
Methanol	2.2	1.4	79	--	--	0.64	0.33	6.0E-02	83
Methyl bromide	8.2E-04	--	--	--	--	--	--	--	8.2E-04
Methyl chloride	1.3E-03	--	--	--	--	--	--	--	1.3E-03
Methylene chloride	1.6E-02	--	--	--	--	--	--	--	1.6E-02
Naphthalene	5.4E-03	--	--	1.0E-04	1.9E-05	--	--	--	5.5E-03
Nickel metal	2.9E-03	--	--	--	--	--	--	--	2.9E-03
Nitrophenol, 4-	6.0E-06	--	--	--	--	--	--	--	6.0E-06
Pentachlorophenol	5.6E-05	--	--	--	--	--	--	--	5.6E-05
Perchloroethylene	4.2E-02	--	--	--	--	--	--	--	4.2E-02
Phenol	1.3	1.1	8.3	--	--	--	--	--	11
Phosphorus Metal, Yellow or White	2.1E-03	--	--	--	--	--	--	--	2.1E-03
Polychlorinated Biphenyls	4.5E-07	--	--	--	--	--	--	--	4.5E-07
Propionaldehyde	0.48	5.3	3.5	--	--	--	--	--	9.3
Selenium Compounds	2.3E-04	--	--	--	--	--	--	--	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	--	--	4.9E-04	9.4E-05	--	--	--	2.7E-03
Total PAH (POM)	0.14	--	--	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
Trichlorophenol, 2,4,6-	1.2E-06	--	--	--	--	--	--	--	1.2E-06
Vinyl Chloride	9.9E-04	--	--	--	--	--	--	--	9.9E-04
Xylene	1.4E-03	--	--	3.4E-04	6.5E-05	--	--	--	1.8E-03
Total HAP Emissions² (tpy)	12	16	120	4.7E-03	8.9E-04	0.92	0.33	6.0E-02	149
Maximum Individual HAP (tpy)	Methanol	Propionaldehyde	Methanol	Formaldehyde	Formaldehyde	Methanol	Methanol	Methanol	Methanol
Maximum Individual HAP Emissions (tpy)	2.2	5.3	79	1.4E-03	2.7E-04	0.64	0.33	6.0E-02	83

2.3 Methodology for Determining Emission Factors

As noted in Appendix C of the PSD permit application, many emission factors used in calculating emissions for the SWEP were based on emission testing at other Enviva facilities. The Permittee provided the following description of the methodology used in selecting appropriate emission factors for the Sampson facility.

Methodology for Deriving VOC Emission Factors

Step One: Review all available stack testing data across Enviva plants and determine which data are representative based on the specific source/equipment configuration for which emissions need to be quantified.

Step Two: Use lab/AP-42 derived VOC multipliers to convert each selected stack testing result to the desired pine percentage. More detail on VOC multipliers is provided below.

VOC Derived Multiplier

Laboratory tests were conducted using hardwood and softwood samples taken at various Enviva plants to evaluate VOC emissions as a function of pine percentage. Linear regression was performed on two laboratory datasets and the resulting equations were used to derive multipliers which can be used to extrapolate VOC emissions at varying pine percentage. Additionally, VOC softwood ratios were developed using US EPA's AP-42 Chapter 10.6.2 Particleboard Manufacturing VOC emission factors for rotary dryers processing 100% hardwood and 100% softwood. These laboratory derived multipliers as well as AP-42 multipliers were applied to the Enviva stack testing data to obtain VOC emission factors at 100% pine for the Sampson permit application.

Step Three: Review the adjusted stack testing data and based on engineering judgement, select the most appropriate emission factor. Depending on the size of the dataset and quality of the data available, the selected value may be either the maximum emission factor or the 95% upper confidence interval.

Step Four: Add safety factor to the emission factor based on engineering judgement.

Methodology for Deriving HAP Emission Factors

Step One: Review all available stack testing data across Enviva plants and determine which data are representative based on the specific source/equipment configuration for which emissions need to be quantified.

Step Two: Review the selected subset of stack testing data and based on engineering judgement select the most appropriate emission factor. Depending on the size and quality of the data available, the selected value may be either the maximum emission factor or the 95% upper confidence interval.

Step Three: Add safety factor to the emission factor based on engineering judgement.

The PSD permit will require extensive testing to verify the assumed emission factors and to ensure compliance with BACT and other emission limits.

3.0 Project Regulatory Review

The emission sources associated with the SWEP are subject to the following regulations. The SWEP affects all sources at the facility with the exception of the emergency generator, the fire pump, and the associated diesel fuel tanks.

3.1 Project Regulatory Review

- 15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Processes – Numerous emission sources at Enviva are subject to 02D .0515. Allowable emissions of PM are calculated from the following equations:

$$E = 4.10 \times P^{0.67} \quad \text{for units with process weight rate less than 30 tons per hour}$$

or

$$E = 55.0(P)^{0.11} - 40 \quad \text{for units with process weight rates greater than 30 tons per hour}$$

where:

E = allowable emission rate in pounds per hour calculated to three significant figures

P = process weight rate in tons per hour

According to the PSD application, the highest amount of PM is emitted from the proposed dryer and green wood hammermill system and the pellet presses and coolers. Compliance with 02D .0515 from these sources is discussed below.

Throughput of the dryer and green wood hammermills is being increased under this permit application to 657,000 ODT/yr, with a short-term maximum hourly throughput of 120 ODT/hr. The allowable emission rate with the short-term maximum hourly throughput is calculated to be 53 lb/hr. The PM emission rate at the outlet of the RTO as reported in the permit application is 7.6 lb/hr, per vendor guarantee. Compliance is anticipated for the dryer system and green wood hammermills, and testing will be required in the revised permit to verify compliance.

The short-term maximum hourly throughput through the pellet presses and coolers is also 120 ODT/hr, which results in an allowable emission rate of 53 lb/hr. Potential PM emissions from this emission source is estimated at a total of 34.4 lb/hr (151 tons per year (tpy)) (or 5.7 lb/hr per cyclone). Compliance is anticipated for the presses and coolers, and testing will be required in the revised permit to verify compliance.

In addition to testing, Enviva ensures compliance with 02D .0515 with the effective operation of the control devices (i.e., cyclones, baghouses, WESP, and RTO, as appropriate). Enviva also conducts visual inspections of baghouses and cyclones monthly and conducts internal inspections of the baghouses annually. To ensure compliance and effective operation of the WESP, Enviva monitors and records the secondary voltage and minimum current through each grid of the precipitator daily. Enviva will also be required to conduct inspection and maintenance of the WESP and the RTO in accordance with the manufacturers' recommendations. Compliance is anticipated.

- 15A NCAC 02D .0516, Sulfur Dioxide Emissions from Combustion Sources – The wood-fired direct heat drying system (ID No. ES-DRYER) is subject to this rule and is limited to a sulfur

dioxide emission rate of no more than 2.3 pounds sulfur dioxide (SO₂) per million Btu heat input. No monitoring, recordkeeping, or reporting is required when firing wood in the dryer system because of the low sulfur content of the fuel. Wood is inherently low enough in sulfur that continued compliance is anticipated.

- 15A NCAC 02D .0530, Prevention of Significant Deterioration – Enviva is a major source under PSD and previously triggered a facility-wide BACT analyses when the greenfield facility was permitted. BACT analyses were previously conducted for emissions of nitrogen oxides (NO_x), VOC, PM/PM10/PM2.5, carbon monoxide (CO), and GHGs. The BACT emission limits for VOC and PM are being revised under this permit application, as discussed in detail in Section 4.0 below. The revised BACT permit condition is provided in Attachment 1. The BACT emission limits and controls for the other pollutants will remain the same, and continued compliance is anticipated.
- 15A NCAC 02D .0540, Particulates from Fugitive Dust Emissions – This condition is applicable facility-wide and is state-enforceable only. No changes are required for this permit modification, and continued compliance is anticipated.
- 15A NCAC 02D .1112, 112(g) Case-by-Case Maximum Achievable Control Technology – Enviva is a major source of HAPs and is subject to a Case-by-Case MACT determination under 112(g) of the Clean Air Act. More discussion on 112(g) Case-by-Case MACT for Enviva is provided below in Section 3.2.

3.2 112(g) Case-by-Case MACT Determination

Potential HAP emissions from Enviva exceed the major source threshold (i.e. 10 tons per year any single HAP or 25 tons per year combined HAP). Section 112(g) of the Clean Air Act requires any new or reconstructed stationary source that is not a regulated “source category” for which a NESHAP has been established to control emissions to the levels that reflect “maximum achievable control technology (MACT).” Because wood pellet manufacturing plants are not a regulated source category and emissions from the Sampson facility exceed the major source threshold, Enviva triggered a 112(g) analysis and underwent a Case-by-Case MACT determination as part of the initial PSD construction permitting process.

The discussion of the original 112(g) Case-by-Case MACT determination is provided in the permit review for Air Permit No. 10286R00, issued on November 17, 2014.² At that time, Enviva asserted its “drying and high-moisture pelletization process reduces uncontrolled emissions to levels significantly below that of its competitors that have installed RTO controls. These differences justify the classification of Enviva's process drying and pelletization process as a separate subcategory, not dependent upon use of RTO control technology to reduce VOC/HAP emissions.” The NCDAQ concurred and concluded 112(g) Case-by-Case MACT was use of a low HAP emitting design for the dryer (ID No. ES-DRYER) without the addition of add-on controls and the Sampson plant was not subject to numeric HAP emission limits under Section 112(g).³

The 112(g) Case by Case MACT regulations as specified in 40 CFR 63.41 defines construction of a major source “as the fabrication, erection, or installation of a **new greenfield site** emitting greater

² Kevin Godwin (11/17/2014).

³ Application No. 8200152.14B, received 09/03/2014.

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” [emphasis added]. 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.”

Since Enviva has already begun operating the Sampson plant under the currently effective PSD permit, the proposed project does not constitute construction of a greenfield site as defined in 40 CFR 63.41. Furthermore, the proposed changes to the plant design do not constitute reconstruction of a major source. Per 40 CFR 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 Sampson 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 SWEP also does not constitute reconstruction of the process or production unit.

Based on this review, the proposed SWEP 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 100%. However, Enviva is also proposing to install an RTO to follow the WESP on the dryer exhaust which will significantly reduce emissions of VOC and organic HAP. In addition, the exhaust stream from the green wood hammermills (ID Nos. ES-GHM-1, ES-GHM-2, and ES-GHM-3) will be routed to the WESP/RTO system (ID Nos. CD-WESP/CD-RTO), which will control VOC and organic HAP emissions from the green wood hammermills. With the installation of the RTO, Enviva will surpass the level of control required under the original case-by-case MACT determination for the Sampson plant, and Enviva believes the intent of the original case-by-case MACT determination continues to be satisfied after completion of the proposed SWEP. The NCDAQ agrees, and case-by-case MACT remains the use of a low HAP emitting design for the dryer (ID No. ES-DRYER) without the addition of add-on controls and with no numeric HAP emission limits under Section 112(g).

Other HAP sources subject to 112(g) Case-by-Case MACT include the dry hammermills, the hammermill area, and the pellet presses and pellet coolers. According to the initial permit application (8200152.14B), no pellet presses (aka referred to as pellet mills) were using HAP control technologies on these emission sources at that time, and Air Permit No. 10386R00 was issued to Enviva on November 17, 2014, with the 112(g) Case-by-Case MACT for these sources of HAPs as no additional control.

NCDAQ subsequently discovered Georgia Biomass located in Waycross, Georgia and Florida Green Circle (now Enviva Pellets Cottdale, LLC) located in Jackson County, Florida both were controlling VOC emissions from the pellet presses at the time the initial permit application was submitted. Pursuant to 40 CFR 63.43(d)(1), MACT emission limitations or MACT requirements must not be less stringent than the emission control which is achieved in practice by the best controlled similar source. Because Enviva’s determination did not consider controls on pellet presses and coolers at these other wood pellet manufacturing facilities, NCDAQ determined Enviva’s 112(g)

Case-by-Case MACT determination for these emission sources did not meet requirements specified in 40 CFR 63.43(d)(1).

NCDAQ issued a letter dated March 1, 2019 requiring Enviva to undergo a revised 112(g) Case-by-Case MACT determination for the pellet coolers and presses and to submit an amended permit application for the revised determination in accordance with 40 CFR 63.43(e). Enviva responded in a letter dated March 21, 2019. In accordance with the settlement agreement dated May 31, 2019, resolving the dispute between Enviva and NCDAQ, Enviva must complete the following:

- Within six months of issuance of this permit (10386R04), Enviva shall submit to NCDAQ an application requesting authorization for installation of an RCO/RTO to control VOC and HAP emissions from the pellet presses and pellet coolers (ID Nos. ES-CLR-1 through ES-CLR-6)
- Installation and startup of the control on the pellet presses and coolers shall be completed by no later than June 1, 2021, provided that, if a permit authorizing the same is not issued until after June 1, 2020, installation and startup of the control device shall be completed within twelve months of permit issuance. Initial compliance for the RCO/RTO shall be demonstrated in accordance with the future issued permit.
- Within six months of issuance of this permit (10386R04), Enviva shall submit to NCDAQ an application requesting authorization for either (i) the installation of an RCO/RTO to control VOC and HAP emissions from the dry hammermills (ID Nos. ES-HM-1 through ES-HM-8), or (ii) an engineering solution that will result in an equivalent or greater reduction in VOC and HAP emissions from the dry hammermills.
- Installation and startup of the control device or engineering solution for the dry hammermills shall be completed by no later than June 1, 2021, provided that, if a permit authorizing the same is not issued until after June 1, 2020, installation and startup of the control device shall be completed within twelve months of permit issuance. Initial compliance for the RCO/RTO or engineering solution shall be demonstrated in accordance with the future issued permit.

3.3 Special Order by Consent

On August 15, 2018, Enviva entered into a Special Order by Consent (SOC) with the NCDAQ to address an exceedance of the BACT emission limit for VOC from the dryer (ID No. ES-DRYER). The SOC became effective on September 21, 2018.

During stack testing conducted on March 29, 2018, the three-run average of VOC emissions from the dryer was 1.21 pounds per ODT. This value exceeded the BACT emission limit of 1.07 pounds of VOC per ODT (i.e., the existing BACT emission limit). The NCDAQ issued a Notice of Violation/Notice of Recommendation for Enforcement on June 14, 2018 for this violation.

To reduce emissions and achieve compliance with the existing BACT emission limit, Enviva completed construction of the RTO used to control emissions from the dryer (ID No. ES-DRYER) and green wood hammermills (ID Nos. ES-GHM-1 through 3) on December 14, 2018, prior to issuance of a PSD permit for the RTO. Enviva acknowledges construction of the RTO prior to

permit issuance constitutes a violation of 15A NCAC 02D .0530, Prevention of Significant Deterioration.

The SOC specifies milestones and timelines the Permittee must follow until the issuance of the PSD permit, including, but not limited to, the following:

- The Permittee must complete the RTO by January 25, 2019, which is 120 days of commencing construction of the RTO. Construction was completed on December 14, 2018.
- The Permittee must begin continuous operations of the RTO on the dryer by March 26, 2019, which is 180 days after commencement of construction of the RTO. Continuous operation began on December 14, 2018.
- The Permittee must submit an emission testing protocol at least 45 days prior to VOC emissions compliance test on the RTO). Test protocol was submitted on December 21, 2018.
- The Permittee must perform emission testing to demonstrate a VOC emission rate of 0.15 lb/ODT at the RTO outlet. Emission testing was conducted on February 7, 2019.
- The Permittee must submit a written report of the test results to the NCDAQ, within 30 days of completion of the test. The test report was submitted on March 6, 2019.
- The Permittee cannot process more than 50% softwood monthly during the duration of the SOC.

The SOC will expire upon the issuance of this air permit containing revised BACT limits or on December 31, 2019, whichever is sooner.

4.0 Prevention of Significant Deterioration

The basic goal of the PSD regulations is to ensure the air quality in clean (i.e. attainment) areas does not significantly deteriorate while maintaining a margin for future industrial growth. The PSD regulations focus on industrial facilities, both new and modified, that create large increases in the emission of certain pollutants. The US EPA promulgated final regulations governing the PSD in the Federal Register published August 7, 1980. Effective March 25, 1982, the NCDAQ received full authority from the US EPA to implement PSD regulations in the state. North Carolina has incorporated US EPA's PSD regulations (40 CFR 51.166) into its air pollution control regulations in 15A NCAC 02D .0530 and 02D .0531.

4.1 PSD Applicability

Under PSD requirements all major new or modified stationary sources of air pollutants regulated and listed in this section of the Clean Air Act must be reviewed and approved prior to construction by the permitting authority. A major stationary source is defined as any one of 28 named source categories that has the potential to emit 100 tons per year of any regulated pollutant or any other stationary source that has the potential to emit 250 tons per year of any PSD regulated pollutant.

Enviva is an existing major stationary source under PSD because it has the potential to emit VOCs in excess of 250 tons per year. This modification is a major modification under PSD because emissions of VOC and PM exceed their SER, as noted previously.

The elements of a PSD review are as follows:

- 1) A BACT Determination as determined by the permitting agency on a case-by-case basis in accordance with 40 CFR 51.166(j),

- 2) An Air Quality Impacts Analysis including Class I and Class II analyses, and
- 3) An Additional Impacts Analysis including effects on soils and vegetation and impacts on local visibility in accordance with 40 CFR 51.166(o).

4.2 BACT Analysis

Under PSD regulations, the basic control technology requirement is the evaluation and application of BACT. BACT is defined as follows [40 CFR 51.155 (b)(12)]:

An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by several guidance documents issued by the US EPA. The only final guidance available is the October 1980 “Prevention of Significant Deterioration – Workshop Manual.” As the US EPA states on page II-B-1, “A BACT determination is dependent on the specific nature of the factors for that **particular case**. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the **degree of expected air quality impacts**.” (emphasis added). The US EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a “top-down” BACT determination method. While the US EPA Environmental Appeals Board recognizes the top-down approach for delegated state agencies,⁴ this procedure has never undergone rulemaking and as such, the process is not binding on fully approved states, including North Carolina.⁵ The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act. As stated in the legislative history and in US EPA’s final October 1980 PSD Workshop Manual, each case is different and the State must decide how to weigh each of the various BACT factors. North Carolina is concerned that the application of US EPA’s DRAFT suggesting a top-down process will result in decisions that are inconsistent with the Congressional intent of PSD and BACT. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

The decision regarding the actual implementation of best available technology is a key one, and the committee places this responsibility with the State, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site.

In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. The weight to be assigned to such factors is to be determined by the State. Such a flexible approach allows the adoption

⁴ See, [https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/PSD+Permit+Appeals+\(CAA\)?OpenView](https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/PSD+Permit+Appeals+(CAA)?OpenView) for various PSD appeals board decisions including standard for review.

⁵North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the US EPA new source performance and hazardous emissions standards, which represent a floor for the State's decision.

This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility, and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities to judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility. If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction or limit its size. This is strictly a State and local decision; this legislation provides the parameters for that decision.

One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country may not be applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. **For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgment at the State level.** [emphasis added]. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology.

Legislative History of the Clean Air Act Amendments of 1977.

The BACT analyses provided by Enviva for the proposed project were conducted consistent with the above definition as well as US EPA's five step "top-down" BACT process. The "top down" methodology results in the selection of the most stringent control technology in consideration of the technical feasibility and the energy, environmental, and economic impacts. Control options are first identified for each pollutant subject to BACT and evaluated for their technical feasibility. Options found to be technically feasible are ranked in order of their effectiveness and then further evaluated for their energy, economic, and environmental impacts. In the event that the most stringent control identified is selected, no further analysis of impacts is performed. If the most stringent control is ruled out based upon economic, energy, or environmental impacts, the next most stringent technology is similarly evaluated until BACT is determined.

After establishing the baseline emissions levels required to meet any applicable NSPS, NESHAPs, or SIP limitations, the "top-down" procedure followed for each pollutant subject to BACT is outlined as follows:

- Step 1: Identify all available control options - from review of US EPA RACT/BACT/LAER Clearinghouse (RBLC), agency permits for similar sources, literature review and contacts with air pollution control system vendors.

- Step 2: Eliminate technically infeasible options - evaluation of each identified control to rule out those technologies that are not technically feasible (i.e., not available and applicable per US EPA guidance).
- Step 3: Rank remaining control technologies - “Top-down” analysis, involving ranking of control technology effectiveness.
- Step 4: Evaluate most effective controls and document results – Economic, energy, and environmental impact analyses are conducted if the “top” or most stringent control technology is not selected to determine if an option can be ruled out based on unreasonable economic, energy or environmental impacts.
- Step 5: Select the BACT – the highest-ranked option that cannot be eliminated is selected, which includes development of an achievable emission limitation based on that technology.

4.3. References Used to Identify Control Technologies

The references and methodologies discussed in this section were used to identify control technologies considered in the BACT analyses found in Sections 4.4 and 4.5.

- RACT/BACT/LAER Clearinghouse (RBLC) database located on EPA's Technology Transfer Network in the EPA electronic bulletin board system, as well as other agency on-line BACT listings. Specifically, the Permittee performed searches of the RBLC database using the following categories:
 - Wood lumber kilns (RBLC Code 30.800); and
 - Other wood products industry sources (RBLC Code 30.999).
- EPA Air Pollution Control Technology Fact Sheets and other EPA guidance and technical reports, which were relied upon as a reference for the likely achievable range of control for control equipment and/or for guidance regarding the BACT process;
- Vendor data; and,
- Professional knowledge and experience.

4.4. BACT Review for VOC Emission Sources

A BACT analysis is required for each new or modified emission source of VOC associated with the SWEP. The following are VOC emission sources evaluated for BACT as part of this PSD permit modification, and each emission source and its selected BACT are discussed in this section:

- Dryer System (ID No. ES-DRYER) and Green Wood Hammermills (ID Nos. ES-GHM-1 to ES-GHM-3);
- Dry Hammermills (ID Nos. ES-HM-1 to ES-HM-8);
- Dried Wood Handling (ID No. ES-HMC);
- Pellet Presses and Coolers (ID Nos. ES-CLR-1 to ES-CLR-6);
- Green Wood Storage Piles (ID Nos. IES-GWSP-1 to IES-GWSP-4) and Bark Fuel Storage Piles (ID Nos. IES-BFSP-1 and IES-BFSP-2); and
- Log Chipping (ID No. IES-CHIP-1) and Bark Hog (ID No. IES-BARKHOG).

A description of each of these emission sources is provided above in Section 2.1.

4.4.1 Dryer (ID No. ES-DRYER) and Green Wood Hammermills (ID Nos. ES-GHM-1 to ES-GHM-3)

4.4.1.1 Identify Control Technologies

Based on the review of RBLC, relevant literature, and industry knowledge, the following control technologies were considered in the BACT analysis for VOC emissions from the dryer and green wood hammermills:

- Thermal Oxidation – Thermal Oxidizer (TO), Recuperative Unit, or Regenerative Thermal Oxidation (RTO);
- Catalytic Oxidation - Regenerative Catalytic Oxidation (RCO) and Thermal Catalytic Oxidation (TCO);
- Wet Scrubber - Packed-Bed/Packed-Tower;
- Bio-oxidation/Bio-filtration; and
- Carbon Adsorption.

Thermal Oxidation

Thermal oxidation reduces VOC emissions by oxidizing VOC to carbon dioxide (CO₂) and water vapor (H₂O) at a high temperature with a residency time between one-half second and one second. Thermal oxidizers can be designed as conventional thermal units, recuperative units, or RTOs. A conventional thermal oxidizer does not have heat recovery capability. Therefore, the fuel costs are extremely high and not suitable for high volume flow applications. In a recuperative unit, the contaminated inlet air is preheated by the combustion exhaust gas stream through a heat exchanger. An RTO can achieve a heat recovery higher than a recuperative oxidizer, with RTOs often having a thermal recovery efficiency of 95% to 99%. RTOs are commonly used to control VOC emissions in high-volume low concentration gas streams because of the significant savings in fuel costs while still achieving equal VOC emissions control efficiencies. Therefore, RTOs are the only type of thermal oxidation considered in this BACT analysis.

An RTO uses high-density media such as a ceramic-packed bed still hot from a previous cycle to preheat an incoming VOC-laden waste gas stream. The preheated, partially oxidized gases then enter a combustion chamber where they are heated by auxiliary fuel (propane or natural gas) combustion to a final oxidation temperature typically between 760-820 °C (1,400-1,500 °F) and maintained at this temperature to achieve maximum VOC destruction. The purified, hot gases exit this chamber and are directed to one or more different ceramic-packed beds cooled by an earlier cycle. Heat from the purified gases is absorbed by these beds before the gases are exhausted to the atmosphere. The reheated packed-bed then begins a new cycle by heating a new incoming waste gas stream.

Particulate control must be placed upstream of thermal oxidation controls to remove unwanted particulate matter that can cause plugging of heat exchange media, unsafe operations such as fires, and/or significant operational and maintenance related difficulties. The existing WESP will serve as particulate control for the RTO.⁶

Catalytic Oxidation

Similar to an RTO, a regenerative catalytic oxidizer (RCO) and a thermal catalytic oxidizer (TCO) oxidize VOC to CO₂ and H₂O. However, RCO and TCO use catalyst to lower the activation energy

⁶ EPA, *Air Pollution Control Technology Fact Sheet, Regenerative Incinerator*, EPA-452/F-03-021.
<https://www3.epa.gov/ttn/catc/dir1/fregen.pdf>

required for the oxidation so that the oxidation can be accomplished at a lower temperature than an RTO. As a result, the overall auxiliary fuel is lower than that for an RTO.

RCO technology is widely used in the reduction of VOC emissions. An RCO operates in the same fashion as an RTO, but it requires only moderate reheating to the operating range of the catalyst, approximately 450 °F. As with the RTO, particulate control must be placed upstream of the RCO to remove unwanted particulate matter, and the existing WESP will serve as particulate control. The risk of catalyst blinding/poisoning exists even with highly efficient particulate control, and catalyst life guarantees are relatively short. The VOC destruction efficiency for an RCO typically ranges from 90 to 99%.⁵

Operating much in the same fashion as an RCO, a TCO passes heated gases through a catalyst without the regenerative properties attributed by the ceramic bed used to recapture heat. Depending on design criteria, a TCO is expected to achieve a similar VOC emission destruction efficiency to that of an RTO.

Wet Scrubber

With packed-bed/packed-tower wet scrubbers (scrubbers), pollutants are removed by inertial or diffusional impaction, reaction with a sorbent or reagent slurry, or absorption into a liquid solvent. Removal efficiencies for gas absorbers vary for each pollutant-solvent system and with the type of absorber used. Most absorbers can achieve removal efficiencies in excess of 90%, and packed-tower absorbers may achieve efficiencies as great as 99% for some pollutant-solvent systems.⁷ Although some VOCs present in the dryer and green wood hammermill exhaust stream are highly soluble in water, alpha/beta-pinene, which make up the predominate species emitted, are only slightly soluble in water. The reduced solubility results in a significantly reduced VOC control efficiency for wet scrubbers.

Bio-oxidation/Bio-filtration

Bio-oxidation/bio-filtration offers a cost-effective alternative to traditional thermal and catalytic oxidation systems in limited situations. In limited applications this air pollution control technology can provide a reduction in VOC emissions of 60 to 99.9%.⁸ Specifically, VOCs are oxidized using living micro-organisms on a media bed (sometimes referred to as a “bioreactor”). A fan is typically used to collect or draw contaminated air from a building or process. If the air is not properly conditioned (heat, humidity, solids), then pre-treatment is a necessary step to obtain optimum gas stream conditions before introducing it into the bioreactor. As the emissions flow through the bed media, the pollutants are absorbed by moisture on the bed media and come into contact with the microbes. Depending on the volume of air required to be treated, the footprint of a bio-oxidation/bio-filtration system can be excessive and take up significant acreage. The microbes consume and metabolize the excess organic pollutants, converting them into CO₂ and water, much like a traditional thermal and catalytic oxidation process.

“Mesophilic” microbes are typically used in these systems. Mesophilic microbes can survive and metabolize VOC materials at conditions up to 110 °F to 120 °F. One company is attempting to develop a commercial-scale technology that employs “thermophilic” microbes, but that technology

⁷ EPA, *Air Pollution Control Technology Fact Sheet, Packed-Bed/Packed-Tower Wet Scrubber*, EPA-452/F-03-015. <https://www3.epa.gov/ttn/catc/dir1/fpack.pdf>

⁸ EPA, *Using Bioreactors to Control Air Pollution*, EPA-456/R-03-003. <https://www3.epa.gov/ttn/catc1/dir1/fbiorect.pdf>

has only been demonstrated on a single pilot scale installation that has a similar – but not exactly the same – exhaust stream profile as Enviva. Thermophilic microbes live and metabolize VOC at higher operating temperatures (~160 °F).

Carbon Adsorption

Carbon adsorption systems use an activated carbon bed to trap VOCs. As the exhaust gas stream passes through the activated carbon bed, VOC molecules are adsorbed onto the surface of the activated carbon, and clean exhaust gas is discharged to the atmosphere. A typical carbon adsorption system for continuous operation includes two activated carbon beds, such that one bed can be desorbing/idle while the other is adsorbing. When the activated carbon in one bed is spent and can no longer effectively adsorb VOC, the bed is taken off line for regeneration, and the VOC-containing gas stream is diverted to the fresh activated carbon bed. This switching allows for the source to operate continuously without shutting down. Regeneration of the sorbent can be achieved either via heating with steam or via vacuuming to remove VOC from the surface.

Depending on the application, carbon adsorption systems can typically achieve VOC control efficiencies of 95%.⁹ Adsorption systems have been successfully used in industry types such as organic chemical processing, varnish manufacture, synthetic rubber manufacture, production of selected rubber products, pharmaceutical processing, graphic arts operations, food production, dry cleaning, synthetic fiber manufacture, pressure sensitive tape manufacturing, and other coating operations.

4.4.1.2 Eliminate Technically Infeasible Options

Wet Scrubbers

As discussed previously, wet scrubbers applied to exhaust gas streams such as those from dryer and green wood hammermills have limited control efficiency given the insolubility of a large portion of the exhaust stream. The use of a scrubber would generate additional environmental impacts and would require onsite or offsite treatment of the scrubber blowdown water to remove/treat the soluble VOC components removed from the exhaust stream. Because of the expected low control efficiency and additional environmental impacts, wet scrubbers are not considered technically feasible.

Bio-oxidation/Bio-filtration

Bio-oxidation/bio-filtration is effective in low temperature ranges, but at higher temperatures, cell components can begin to decompose and proteins within the cell's enzymes can become denatured and ineffective. The temperature of the exhaust steam from the dryer and green wood hammermills is expected to be 172 °F, which exceeds the typical operating temperatures of a bio-oxidation/bio-filtration system. Additionally, the primary constituents of the VOC in the exhaust stream are terpenes, which are highly viscous and would cause the bio-oxidation/bio-filtration system to foul. Furthermore, the expected footprint of a unit sized to handle the volume of gas needed for treatment would be extensive and impractical. Finally, the use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Due to the temperature limitations of this control technology, expected fouling, significant land requirements, and the undemonstrated nature of this technology at a pellet manufacturing facility, bio-oxidation/bio-filtration has been eliminated from further consideration in this BACT analysis.

⁹ New Jersey DEP's State of the Art (SOTA) *Manual for Chemical and Pharmaceutical Processing and Manufacturing Industries* (July 1997). <http://www.state.nj.us/dep/aqpp/downloads/sota/sota5.pdf>

Carbon Adsorption

Both the high temperature and high relative humidity of the combined exhaust stream for the dryer and green wood hammermills would limit the effectiveness of carbon adsorption as a VOC control technology for these sources. Carbon adsorption is not recommended for exhaust streams with relative humidity above 50% or temperatures above 150 °F. When the exhaust stream has a high relative humidity, the water molecules and VOCs in the exhaust stream compete for active adsorption site on the carbon, drastically reducing the efficiency and overall effectiveness of the adsorbent. Additionally, because heat is used to regenerate the carbon bed, the high exhaust stream temperatures would be in the range normally used to desorb VOCs from the carbon. Carbon adsorption is, therefore, determined to be technically infeasible for these sources.

4.4.1.3 Rank Remaining Control Technologies by Effectiveness

The remaining control technologies were ranked from the most stringent to the least stringent, as shown in the table below.

Control Technology	Approximate Control Efficiency (%)
RTO	95% to 99%
Catalytic Oxidizer	90% to 99%

4.4.1.4 Evaluate Technically Feasible Control Options

Enviva proposes to install an RTO to reduce VOC emissions from the dryer and green wood hammermills. Because the Permittee has selected the top-option for BACT, detailed economic, energy, and environmental information on the lower efficient option (i.e., the catalytic oxidizer) is not required.

4.4.1.5 Select BACT for VOC Emissions

An RTO is the selected BACT for the dryer and green wood hammermills. Enviva proposes a maximum emission rate of 0.15 lb /ODT as the BACT limit for VOC control of the dryer and green wood hammermills. The emission limit reflects new source test data acquired for similar Enviva facilities. Enviva will conduct testing to demonstrate compliance with the emission limit and to establish an operating temperature range for the RTO. The Permittee will also conduct associated monitoring, recordkeeping, and reporting to demonstrate compliance with the BACT limit.

The NCDAQ concurs with the Permittee’s proposal. The NCDAQ has determined an RTO is BACT for VOC emissions from the dryer and green wood hammermills and the BACT emission limit is 0.15 lb of VOC /ODT from the dryer and green wood hammermills.

4.4.2 Dry Hammermills (ID Nos. ES-HM-1 to ES-HM-8)

4.4.2.1 Identify Control Technologies

The control technologies identified for control of VOC from the dry hammermills and a description of each add-on control device considered in the BACT analysis for VOC emissions from the dry hammermills is provided above in Section 4.4.1.1.

4.4.2.2 Eliminate Technically Infeasible Options

As described above in Section 4.4.1.2, wet scrubbers, bio-oxidation/bio-filtration, and carbon adsorption are not considered feasible control options for the dry hammermills.

4.4.2.3 Rank Remaining Control Technologies by Effectiveness

Please refer to Section 4.4.1.3 for ranking of the RTO and RCO.

4.4.2.4 Evaluate Technically Feasible Control Options

A BACT analysis, consistent with the Clean Air Act, was performed on the add-on control technologies that were shown to be technically feasible. Based on a review of literature and discussions with vendors, Enviva determined that an RTO is a more cost-effective control device than catalytic oxidation units (RCO and TCO) and has significantly less operational and maintenance issues while still achieving the same level of VOC control. An overview of annualized costs and cost effectiveness as documented in EPA’s Air Pollution Control Technology Fact Sheet¹⁰ is provided below:

Control Technology	Annualized Cost	Cost Effectiveness
RTO	\$12 - \$50 per scfm	\$149 to \$25,000 per ton
Catalytic Oxidizer	\$16 to \$63 scfm	\$185 to \$31,000 per ton
<u>Notes:</u> Cost ranges as expressed in 2018 dollars using Consumer Price Index Price Inflation calculator at https://www.bls.gov/data/inflation_calculator.htm .		

Because the same level of control is achieved at lower costs with the RTO, the evaluation of technically feasible options will only address the RTO.

Assumptions Used in the BACT analysis

To perform the BACT analysis, it was necessary to make engineering judgments concerning the control efficiency of various add-on controls. The destruction efficiency of the RTO ranges from 95 to 99%, with 95% selected as a conservative estimate. Other assumptions used in performing this analysis are included in the detailed cost calculations presented in Appendix F of the permit application. All cost estimates were prepared using potential VOC emission rates for the dry hammermills under the SWEP. Annual operational hours were assumed to be 8,760 per year.

Cost Effectiveness

The cost impacts of controlling VOC emissions from the dry hammermills with an RTO are presented in the table below. The cost impacts were estimated using the Office of Air Quality Planning and Standards Control Cost Manual (CCM),¹¹ operating experience, EPA Technology Fact

¹⁰ EPA, *Air Pollution Control Technology Fact Sheet, Regenerative Incinerator*, EPA-452/F-03-021. <https://www3.epa.gov/ttn/catc/dir1/fregen.pdf>

¹¹ *Office of Air Quality Planning and Standards Cost Control Manual*. Fourth Edition. EPA-450/3-90-006. Office of Air Quality Planning and Standards, Environmental Protection Agency, Research Triangle Park, North Carolina. January 1990.

Sheet for RTOs, quotes for utilities, and vendor quotes for the RTO. All costs were updated to 2017 dollars using Consumer Price Index (CPI) Price Inflation calculator.¹²

Add-On Control Technology	Emissions (tons/yr)	VOC Emissions Reduction (%)	VOC Emissions Reduction (tpy)	Annual Operating Cost (\$/yr)	Cost - Effectiveness (\$/Ton)
RTO	168	95%	159	\$3,313,346	\$20,818

Energy and Environmental Impacts

In addition to high cost effectiveness of this control device, the RTO also has associated negative energy and environmental impacts. The secondary environmental impacts are presented in the table below for the RTO. In the case of thermal oxidization, the combustion of natural gas would result in an increase of combustion pollutants, specifically, NO_x, SO₂, PM, CO, VOCs, and GHG.

Control Technology	Emissions (tpy)					
	NO_x	SO₂	PM	CO	VOC	GHG
RTO	3.96	0.016	0.21	2.31	0.30	3,819

Notes:

- Emissions based on an RTO with a heat input of 6.25 MMBtu/hr and operating at 8,760 hours per year.
- Burners on the RTO will combust either natural gas or propane. Potential emissions equal to the maximum emissions between natural gas and propane on a pollutant-by-pollutant basis.
- Emission factors from AP-42, Section 1.4 - Natural Gas Combustion, 07/98 and AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion, 07/08.
- Includes emissions of CO and NO_x generated during combustion of the VOC waste stream.

In addition to increased emissions, the RTO also requires an additional 5,028 Mw-hr/year consumption of electricity to operate.

4.4.2.5 Select BACT for VOC Emissions

The installation of add-on controls for VOC emissions from dry hammermills is not considered cost effective. Therefore, Enviva proposes good operating procedures as BACT for VOC emissions from the dry hammermills. Enviva also proposes a VOC emission limit of 0.60 lb/ODT from the dry hammermills. The proposed BACT emission limit reflects an increase in the softwood throughput to 100% and the production rate requested with this permit modification for the SWEP. The emission limit also reflects new source test data acquired for similar Enviva facilities.

The NCDAQ concurs with the Permittee’s proposal. The NCDAQ has determined good operating procedures is BACT for VOC emissions from the dry hammermills and the BACT emission limit is 0.60 lb of VOC /ODT from the dry hammermills.

¹² Consumer Price Index Calculator developed by the US Department of Labor Bureau of Labor Statistics.

4.4.3 Dried Wood Handling (ID No. ES-DWH)

4.4.3.1 Identify Control Technologies

The control technologies identified for control of VOC from dried wood handling and a description of each add-on control device considered in the BACT analysis for VOC emissions from dried wood handling is provided above in Section 4.4.1.1.

4.4.3.2 Eliminate Technically Infeasible Options

As described above in Section 4.4.1.2, wet scrubbers, bio-oxidation/bio-filtration, and carbon adsorption are not considered feasible control options for dry wood handling operations.

4.4.3.3 Rank Remaining Control Technologies by Effectiveness

Please refer to Section 4.4.1.3 for ranking of the RTO and RCO.

4.4.3.4 Evaluate Technically Feasible Control Options

As noted in Section 4.4.2.4 above, the evaluation of technically feasible options will only address RTO controls because the same level of control is achieved at lower costs with the RTO.

Assumptions Used in the BACT analysis

To perform the BACT analysis, it was necessary to make engineering judgments concerning the control efficiency of various add-on controls. The destruction efficiency of the RTO ranges from 95 to 99%, with 95% selected as a conservative estimate. Other assumptions used in performing this analysis are included in the detailed cost calculations presented in Appendix F of the permit application. All cost estimates were prepared using potential VOC emission rates for dry wood handling under the SWEP. Annual operational hours were assumed to be 8,760 per year.

Cost Effectiveness

The cost impacts of controlling VOC emissions from dry wood handling with an RTO are presented in the table below. The cost impacts were estimated using the CCM, operating experience, EPA Technology Fact Sheet for RTOs, quotes for utilities, and vendor quotes for the RTO. All costs were updated to 2017 dollars using CPI calculator.

Add-On Control Technology	Emissions from DWH (tons/yr)	VOC Emissions Reduction (%)	VOC Emissions Reduction (tpy)	Annual Operating Cost (\$/yr)	Cost - Effectiveness (\$/Ton)
RTO	40.8	95%	38.8	\$566,776	\$14,619

Energy and Environmental Impacts

In addition to high cost effectiveness of this control device, the RTO also has associated negative energy and environmental impacts. The energy and secondary environmental impacts are presented in the table below for the RTO. In the case of thermal oxidization, the combustion of natural gas

would result in an increase of combustion pollutants, specifically, NO_x, SO₂, PM, CO, VOCs, and GHG.

Control Technology	Emissions (tpy)					
	NO _x	SO ₂	PM	CO	VOC	GHG
RTO	2.87	0.012	0.15	1.69	0.22	2,751
<u>Notes:</u> <ul style="list-style-type: none"> • Emissions based on an RTO with a heat input at 4.6 MMBtu/hr and operating at 8,000 hours per year. • Burners on the RTO will combust either natural gas or propane. Potential emissions equal to the maximum emissions between natural gas and propane on a pollutant-by-pollutant basis. • Emission factors from AP-42, Section 1.4 - Natural Gas Combustion, 07/98 and AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion, 07/08. • Includes emissions of CO and NO_x generated during combustion of the VOC waste stream. 						

In addition to increased emissions, the RTO also requires an additional 593 Mw/year consumption of electricity to operate.

4.4.3.5 Select BACT for VOC Emissions

The installation of add-on controls for VOC emissions from dry wood handling is not considered cost effective. Therefore, Enviva proposes good operating procedures as BACT for VOC emissions from dry wood handling. Enviva also proposes a VOC emission limit of 0.12 lb/ODT from the dry wood handling operations. The proposed BACT emission limit was derived from NCASI's Wood Products Database (February 2013)¹³ for dry wood handling operations at an oriented strand board mill.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined good operating procedures is BACT for VOC emissions from the dry wood handling operations and the BACT emission limit is 0.12 lb of VOC /ODT from the dry wood handling operations.

4.4.4 Pellet Presses and Pellet Coolers (ID Nos. ES-CLR-1 to ES-CLR-6)

4.4.4.1 Identify Control Technologies

The control technologies identified for control of VOC from presses and coolers and a description of each add-on control device considered in the BACT analysis for VOC emissions from the presses and coolers is provided above in Section 4.4.1.1.

4.4.4.2 Eliminate Technically Infeasible Options

As described above in Section 4.4.2.1, wet scrubbers, bio-oxidation/bio-filtration, and carbon adsorption are not considered feasible control options for the wood pellet presses and coolers.

4.4.4.3 Rank Remaining Control Technologies by Effectiveness

Please refer to Section 4.4.1.3 for ranking of the RTO and RCO.

¹³ National Council for Air and Stream Improvement (NCASI)

4.4.4.4 Evaluate Technically Feasible Control Options

As noted in Section 4.4.2.4 above, the evaluation of technically feasible options will only address RTO controls because the same level of control is achieved at lower costs with the RTO.

Assumptions Used in the BACT analysis

To perform the BACT analysis, it was necessary to make engineering judgments concerning the control efficiency of various add-on controls. The destruction efficiency of the RTO ranges from 95 to 99%, with 95% selected as a conservative estimate. Because PM emissions from the press and coolers are controlled only by cyclones, the cost of the RTO includes the cost of the baghouse, which is required to reduce PM emissions to an appropriate level prior to the RTO.

Other assumptions used in performing this analysis are included in the detailed cost calculations presented in Appendix F of the permit application. All cost estimates were prepared using potential VOC emission rates for the presses and coolers under the SWEP. Annual operational hours were assumed to be 8,760 per year.

Cost Effectiveness

The cost impacts of controlling VOC emissions from the presses and coolers with an RTO are presented in the table below. The cost impacts were estimated using the CCM, operating experience, EPA Technology Fact Sheet for RTOs, quotes for utilities, and vendor quotes for the RTO. All costs were updated to 2017 dollars using CPI calculator.

Add-On Control Technology	VOC Emissions from Presses and Coolers (tons/yr)	VOC Emissions Reduction (%)	VOC Emissions Reduction (tpy)	Annual Operating Cost (\$/yr)	Cost - Effectiveness (\$/Ton)
Baghouse/RTO	572	95%	544	\$3,800,354	\$6,991

Energy and Environmental Impacts

In addition to high cost effectiveness of this control device, the RTO also has associated negative energy and environmental impacts. The energy and secondary environmental impacts are presented in the table below for the RTO. In the case of thermal oxidization, the combustion of natural gas would result in an increase of combustion pollutants, specifically, NO_x, SO₂, PM, CO, VOCs, and GHG.

Control Technology	Emissions (tpy)					
	NO _x	SO ₂	PM	CO	VOC	GHG
RTO	10.0	0.041	0.54	5.83	0.77	9,783

Notes:

- Emissions based on an RTO with a heat input of 16.25 MMBtu/hr and operating at 8,760 hours per year.
- Burners on the RTO will combust either natural gas or propane. Potential emissions equal to the maximum emissions between natural gas and propane on a pollutant-by-pollutant basis.
- Emission factors from AP-42, Section 1.4 - Natural Gas Combustion, 07/98 and AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion, 07/08.
- Includes emissions of CO and NO_x generated during combustion of the VOC waste stream.

In addition to increased emissions, the RTO also requires an additional 5,589 Mw-hr/year consumption of electricity to operate.

4.4.4.5 Select BACT for VOC Emissions

The installation of add-on controls for VOC emissions from presses and coolers is not considered cost effective. Therefore, Enviva proposes good operating procedures as BACT for VOC emissions from these emission sources. Enviva also proposes a VOC emission limit of 1.74 lb/ODT from the presses and coolers. The proposed BACT emission limit reflects an increase in the softwood throughput to 100% and the production rate requested with this permit modification for the SWEP. The emission limit also reflects new source test data acquired for similar Enviva facilities. Enviva will conduct testing of the pellet presses and coolers to demonstrate compliance with the emission limit.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined good operating procedures is BACT for VOC emissions from presses and coolers and the BACT emission limit is 1.74 lb of VOC /ODT from these emission sources, based on a 3-hour average.

4.4.5 Green Wood Storage Piles (ID Nos. IES-GWSP-1 to IES-GWSP-4) and Bark Fuel Storage Piles (ID Nos. IES-BFSP-1 and IES-BFSP-2)

4.4.5.1 Identify Control Technologies

The VOC emissions from the storage piles are fugitive. Because of the size of the piles, covering or enclosing the piles to capture VOC emissions is not feasible. Further, no work practice or operational measures are known that will reduce emissions of VOC from these source types, while allowing for proper function and operation.

4.4.5.2 Select BACT for VOC Emissions

Because no feasible control options exist to capture, control, or minimize the VOC emissions, Enviva proposes no control or work practices as BACT for VOC emissions from these emission sources. The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined BACT is no control or work practice standards for green wood and bark fuel storage piles.

4.4.6 Log Chipping (ID No. IES-CHIP-1) and Bark Hog (ID No. IES-BARKHOG)

4.4.6.1 Identify Control Technologies

The VOC emissions from the log chipper and bark hog are fugitive, which makes capturing and controlling emissions from these sources infeasible. Further, no work practice standards or operational measures are known that would reduce VOC emissions from these emission sources.

4.4.6.2 Select BACT for VOC Emissions

Because no feasible control options exist to capture, control, or minimize the VOC emissions, Enviva proposes no control or work practices as BACT for fugitive VOC emissions from these emission

sources. The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined BACT is no control or work practice standards for log chipping and the bark hog.

4.5. BACT Review for PM Emission Sources

A BACT analysis is required for each new or modified emission source of PM associated with the SWEP. The following are PM emission sources evaluated for BACT as part of this PSD permit modification, and each emission source and its selected BACT are discussed in this section:

- Dryer System (ID No. ES-DRYER) and Green Wood Hammermills (ID Nos. ES-GHM-1 to ES-GHM-3);
- Dry Hammermills (ID Nos. ES-HM-1 to ES-HM-8);
- Dried Wood Handling (ID No. ES-HMC);
- Pellet Presses and Coolers (ID Nos. ES-CLR-1 to ES-CLR-6);
- Hammermill Conveying System (ID No. ES-HMC);
- Pellet Cooler LP Fines Relay System (ID No. ES-PCLP);
- Pellet Sampling Transfer Bin (ID No. ES-PSTB);
- Hammermill Area and Pellet Cooler HP Fines Relay System (ID Nos. ES-HMA and ES-PCHP);
- Pellet Mill Feed Silo (ID No. ES-PMFS);
- Finished Product Handling / Pellet Loadout Bins, and Pellet Mill Loadouts (ID Nos. ES-FPH, ES-PB-1 to 4, and ES-PL-1 and 2);
- Green Wood Handling (ID No. ES-GWH);
- Green Wood Storage Piles (ID Nos. IES-GWSP-1 to IES-GWSP-4) and Bark Fuel Storage Piles (ID Nos. IES-BFSP-1 and IES-BFSP-2);
- Bark Fuel Bin (ID No. IES-BFB);
- Dry Shaving Material Handling (ID No. IES-DRYSHAVE);
- Debarker (ID No. IES-DEBARK);
- Bark Hog (ID No. IES-BARKHOG); and
- Paved Roads (--).

Log Chipping (ID No. IES-CHIP-1) occurs inside a building, and no PM10 or PM2.5 emissions are anticipated from this source.¹⁴ Therefore, PM emissions from log chipping are considered negligible and are not quantified. A BACT analysis for PM emissions from log chipping was not conducted.

4.5.1 Dryer (ID No. ES-DRYER) and Green Wood Hammermills (ID Nos. ES-GHM-1 through ES-GHM-3)

4.5.1.1 Identify Control Technologies

Based on the review of RBLC, relevant literature, and industry knowledge, the following control technologies were considered in the BACT analysis for PM emissions from the dryer and green wood hammermills:

- Cyclone;
- Baghouse;
- Scrubber;
- Electrostatic Precipitator (ESP); and

¹⁴Emission factors for PM10 and PM2.5 for chipping and shaving from NCDAQ's "Woodworking Emissions Calculator Revision C July 2007."

- WESP.

Cyclone

Cyclones are frequently used for product recovery or emissions control of dry dusts and powders, and as primary collectors on high dust loading operations. Entrained particulate matter is removed in a cyclone through centrifugal and inertial forces. Thus, particulate-laden gas is forced to change direction and fall out of the gas stream where it accumulates and slides down the cyclone walls into a receiving vessel. The control efficiency range for conventional single cyclones is estimated to be 70 to 90% for PM.¹⁵

Baghouse

A fabric filtration device (baghouse) consists of several filtering elements (bags) along with a bag cleaning system contained in a main shell structure incorporating dust hoppers. Baghouses use fabric bags as filters to collect particulate matter. The particulate-laden gas enters a fabric filter compartment and passes through a layer of particulate and filter bags. The collected particulate forms a cake on the bag, which enhances the bag's filtering efficiency. However, excessive caking will increase the pressure drop across the fabric filter and reduce its efficiency. A phenomenon known as "blinding" occurs when cake builds up to the point that air can no longer pass through the baghouse during normal operation or the baghouse becomes clogged with wet and/or resinous compounds.

The particulate removal efficiency of baghouses depends on a variety of particle and operational characteristics. Particle characteristics that affect the collection efficiency include particle size distribution, particle cohesion characteristics, and particle electrical resistivity. Operational parameters that affect baghouse collection efficiency include air-to-cloth ratio, operating pressure loss, cleaning sequence, interval between cleanings, cleaning method, and cleaning intensity. In addition, the particle collection efficiency and size distribution can be affected by certain fabric properties (e.g., structure of fabric, fiber composition, and bag properties). Typical baghouse control efficiencies range between 99 and 99.9% for PM with a typical exhaust grain loading of 1 to 100 gr/scf.¹⁶

Wet Scrubber

As discussed above, wet scrubbers remove pollutants by inertial or diffusional impaction, reaction with a sorbent or reagent slurry, or absorption into a liquid solvent. In addition to VOCs, scrubbers can be used to control PM emissions; however, they are limited to applications in which dust loading is low. Collection efficiencies for PM removal range from 50 to 95%, depending on the application.¹⁷

Electrostatic Precipitator

ESPs remove particles from a gas stream using 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

¹⁵ EPA, *Air Pollution Control Technology Fact Sheet, Cyclones*, EPA-452/F-03-005. <https://www3.epa.gov/ttn/catc/dir1/fcyclon.pdf>

¹⁶ EPA, *Air Pollution Control Technology Fact Sheet, Fabric Filter – Pulse-Jet Cleaned Type (also referred to as Baghouses)*, EPA-452/F-03-025. <https://www3.epa.gov/ttn/catc/dir1/ff-pulse.pdf>

¹⁷ EPA, *Air Pollution Control Technology Fact Sheet, Packed-Bed/Packed-Tower Wet Scrubber*, EPA-452/F-03-015. <https://www3.epa.gov/ttn/catc/dir1/fpack.pdf>

removed from the collecting electrodes by periodic mechanical rapping. Typical PM control efficiencies for PM range between 99 and 99.9%.¹⁸

Wet Electrostatic Precipitator

Similar to ESPs, WESPs remove particles from a gas stream using 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. Unlike ESPs, collected particles in a WESP are removed from the collecting electrodes by washing utilizing a mild hydroxide solution to prevent build-up of resinous materials present in the dryer exhaust. WESPs, rather than ESPs, are used in the forest products industries for control of emissions from similar sources because ESPs cannot reliably operate due to resin build-up on collection electrodes. Typical PM control efficiencies for PM range between 99 and 99.9%.¹⁹

4.5.1.2 Eliminate Technically Infeasible Options

All PM control devices listed above in Section 4.5.1.1., with the exception of ESPs, are considered technically feasible. ESPs are not typically used in the forest products industries for control of emissions because ESPs cannot reliably operate due to resin build-up on collection electrodes.

4.5.1.3 Rank Remaining Control Technologies by Effectiveness

All technically feasible control technologies were ranked from the most stringent to the least stringent, as shown in the table below.

Control Technology	Approximate Control Efficiency (%)
WESP	99% to 99.9%
Baghouse	99% to 99.9%
Scrubber	50% to 95%
Cyclone	70% to 90%

4.5.1.4 Evaluate Technically Feasible Control Options

A WESP is currently installed on the dryer for PM control, and Enviva is proposing this control option as BACT for PM from the dryer and green wood hammermills. Because the Permittee has selected the top-option for BACT, detailed economic, energy, and environmental information on the lower efficient options is not required.

4.5.1.5 Select BACT for PM Emissions

A WESP (which is existing at the facility) is the selected BACT for PM controls for the dryer and green wood hammermills. Enviva proposes a maximum emission rate of 0.105 lb /ODT as the BACT limit for PM control of the dryer and green wood hammermills. The Permittee will conduct

¹⁸EPA, *Air Pollution Control Technology Fact Sheet, Dry Electrostatic Precipitator (ESP) – Wire-Plate Type*, EPA-452/F-03-028. <https://www3.epa.gov/ttn/catc/dir1/fdespwpl.pdf>

¹⁹EPA, *Air Pollution Control Technology Fact Sheet, Wet Electrostatic Precipitator (ESP) – Wire Plate Type*, EPA-452/F-03-030. <https://www3.epa.gov/ttn/catc/dir1/fwespwpl.pdf>

monitoring of the WESP and associated recordkeeping and reporting to demonstrate compliance with the BACT limit.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined a WESP is BACT for PM control for the dryer and green wood hammermills and the BACT emission limit is 0.105 lb of PM /ODT from the dryer and green wood hammermills.

4.5.2 Dry Hammermills (ID Nos. ES-HM-1 to ES-HM-8)

4.5.2.1 Identify Control Technologies

The control technologies identified for control of PM from the dry hammermills and a description of each add-on control device considered in the BACT analysis for PM emissions from the dry hammermills is provided above in Section 4.5.1.1.

4.5.2.2 Eliminate Technically Infeasible Options

All PM control devices listed above in Section 4.5.1.1., with the exception of ESPs, are considered technically feasible. ESPs are not typically used in the forest products industries for control of emissions because ESPs cannot reliably operate due to resin build-up on collection electrodes.

4.5.2.3 Rank Remaining Control Technologies by Effectiveness

Please refer to Section 4.5.1.3 for ranking of control devices for PM control.

4.5.2.4 Evaluate Technically Feasible Control Options

Particulate matter emissions generated by the dry hammermills are currently controlled by individual baghouses, and Enviva is proposing this control option as BACT for PM from the dry hammermills. The control efficiency for the WESP and baghouse are similar, with both devices achieving upwards of 99.9% PM removal efficiency. Because the Permittee has selected the top-option for BACT, detailed economic, energy, and environmental information on the lower efficient options is not required.

4.5.2.5 Select BACT for PM Emissions

Baghouses, which are currently installed on the dry hammermills, are the selected BACT for PM controls for the dry hammermills. Enviva proposes a maximum emission rate of 0.004 gr/scf as the BACT limit for PM control of the dry hammermills. The Permittee will also conduct monitoring, recordkeeping, and reporting to ensure compliance with the BACT limit.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined baghouses are BACT for PM control for the dry hammermills and the BACT emission limit for PM is 0.004 gr/scf for the dry hammermills.

4.5.3 Dried Wood Handling (ID No. ES-DWH)

4.5.3.1 Identify Control Technologies

The control technologies identified for control of PM from dried wood handling and a description of each add-on control device considered in the BACT analysis for PM emissions from dried wood handling is provided above in Section 4.5.1.1.

4.5.3.2 Eliminate Technically Infeasible Options

All PM control devices listed above in Section 4.5.1.1., with the exception of ESPs, are considered technically feasible. ESPs are not typically used in the forest products industries for control of emissions because ESPs cannot reliably operate due to resin build-up on collection electrodes.

4.5.3.3 Rank Remaining Control Technologies by Effectiveness

Please refer to Section 4.5.1.3 for ranking of control devices for PM control.

4.5.3.4 Evaluate Technically Feasible Control Options

Particulate matter emissions from dry wood handling are currently controlled by individual baghouses, and Enviva is proposing this control option as BACT for PM from the dry wood handling operations. The control efficiency for the WESP and baghouse are similar, with both devices achieving upwards of 99.9% PM removal efficiency. Because the Permittee has selected the top-option for BACT, detailed economic, energy, and environmental information on the lower efficient options is not required.

4.5.3.5 Select BACT for PM Emissions

Baghouses, which are currently installed on the dry wood handling operations, are the selected BACT for PM controls for this emission source. Enviva proposes a maximum emission rate of 0.004 gr/scf as the BACT limit for PM. The Permittee will also conduct monitoring of the baghouses, recordkeeping, and reporting to ensure compliance with the BACT limit.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined baghouses are BACT for PM control for dry wood handling operations and the BACT emission limit for PM is 0.004 gr/scf for the dry wood handling operations.

4.5.4 Pellet Presses and Pellet Coolers (ID Nos. ES-CLR-1 to ES-CLR-6)

4.5.4.1 Identify Control Technologies

The control technologies identified for control of PM from pellet presses and pellet coolers and a description of each add-on control device considered in the BACT analysis for PM emissions from the pellet presses and pellet coolers is provided above in Section 4.5.1.1.

4.5.4.2 Eliminate Technically Infeasible Options

All PM control devices listed above in Section 4.5.1.1., with the exception of ESPs, are considered technically feasible. ESPs are not typically used in the forest products industries for control of emissions because ESPs cannot reliably operate due to resin build-up on collection electrodes.

4.5.4.3 Rank Remaining Control Technologies by Effectiveness

Please refer to Section 4.5.1.3 for ranking of control devices for PM control.

4.5.4.4 Evaluate Technically Feasible Control Options

A BACT analysis, consistent with the Clean Air Act, was performed on the add-on control technologies that were shown to be technically feasible. Based on a review of literature and discussions with vendors, Enviva determined that the baghouse is a more cost-effective control device than WESP and has essentially the same control efficiency. The wet scrubber is also less cost-effective than the baghouse. An overview of annualized costs and cost effectiveness as documented in EPA's Air Pollution Control Technology Fact Sheets is provided below:²⁰

- A scrubber would achieve a lower PM control efficiency than a baghouse (typically in the range of 50-95%, depending on the application) and would have a higher annualized cost (\$17 to \$78 per scfm) compared to a baghouse (\$6 to \$39 per scfm).
- While a WESP would achieve a comparable PM removal efficiency to that of a baghouse, the annualized costs associated with a WESP would be higher (\$9 to \$47 per scfm for a WESP vs. \$6 to \$39 per scfm for a baghouse).

Because the same level of control is achieved at lower costs with the baghouse, other technically feasible options will not be address in the BACT analysis.

Assumptions Used in the BACT analysis

To perform the BACT analysis, it was necessary to make engineering judgments concerning the control efficiency of various add-on controls. The removal efficiency of a baghouse ranges from 99% to 99.9% and 99% was selected as a conservative estimate.

Other assumptions used in performing this analysis are included in the detailed cost calculations presented in Appendix F of the permit application. All cost estimates were prepared using potential PM emission rates for the coolers and presses under the SWEP. Annual operational hours were assumed to be 8,760 per year.

Cost Effectiveness

The cost impacts of controlling PM emissions from the coolers and presses with baghouses are presented in the table below. The cost impacts were estimated using the Office of Air Quality CCM operating experience, EPA Technology Fact Sheet for baghouses, quotes for utilities, and vendor quotes for the baghouse. All costs were updated to 2017 dollars using CPI inflation calculator.

²⁰ EPA, *Air Pollution Control Technology Fact Sheet, Fabric Filter – Pulse-Jet Cleaned Type (also referred to as Baghouses)*, EPA-452/F-03-025. <https://www3.epa.gov/ttn/catc/dir1/ff-pulse.pdf>

EPA, *Air Pollution Control Technology Fact Sheet, Packed-Bed/Packed-Tower Wet Scrubber*, EPA-452/F-03-015. <https://www3.epa.gov/ttn/catc/dir1/fpack.pdf>

EPA, *Air Pollution Control Technology Fact Sheet, Wet Electrostatic Precipitator (ESP) – Wire Plate Type*, EPA-452/F-03-030. <https://www3.epa.gov/ttn/catc/dir1/fwespwpl.pdf>

Add-On Control Technology	PM Emissions from Presses and Coolers (tons/yr)	PM Emissions Reduction (%)	PM Emissions Reduction (tpy)	Annual Operating Cost (\$/yr)	Cost - Effectiveness (\$/Ton)
Baghouse	151	99%	149.5	\$1,465,025	\$9,807

Energy and Environmental Impacts

In addition to high cost effectiveness of this control device, baghouse also has associated negative energy and environmental impacts. The baghouse is anticipated to result in an additional 2,111 Mw-h/yr consumption of electricity. The installation of baghouses would also result in adverse impacts in the form of solid waste generated from the disposal of baghouse filter media.

4.5.4.5 Select BACT for PM Emissions

The installation of baghouses for control of PM emissions from the presses and coolers is not considered cost effective. Therefore, cyclones, which are currently used, are selected BACT for the presses and coolers. Enviva proposes a maximum emission rate of 0.04 gr/scf as the BACT limit for PM control of these emission sources. The Permittee will also conduct monitoring of the cyclones and associated recordkeeping and reporting to ensure compliance with the BACT limit.

The NCDAQ concurs with the Permittee’s proposal. The NCDAQ has determined cyclones are BACT for PM control for the presses and coolers and the BACT emission limit for PM is 0.04 gr/scf for the presses and coolers.

4.5.6 Other PM Emission Sources Currently Controlled with Baghouses

This section discusses BACT for several similar PM emission sources at Enviva. These emission sources are all point sources and are currently controlled by baghouses. The BACT analyses for the following emission sources are discussed in this section:

- Hammermill Conveying System (ID No. ES-HMC);
- Pellet Cooler LP Fines System (ID No. ES-PCLP);
- Pellet Sampling Transfer Bin (ID No. ES-PSTB);
- Hammermill Area and Pellet Cooler HP Fines Relay System (ID Nos. ES-HMA and ES-PCHP);
- Pellet Mill Feed Silo (ID No. ES-PMFS); and
- Finished Product Handling / Pellet Loadout Bins, and Pellet Mill Loadouts (ID Nos. ES-FPH, ES-PB-1 to 4, and ES-PL-1 and 2).

4.5.6.1 Identify Control Technologies

The control technologies identified for control of PM emissions from the emission sources noted above and a description of each add-on control device is provided above in Section 4.5.1.1

4.5.6.2 Eliminate Technically Infeasible Options

All PM control devices listed above in Section 4.5.1.1., with the exception of ESPs, are considered technically feasible. ESPs are not typically used in the forest products industries for control of emissions because ESPs cannot reliably operate due to resin build-up on collection electrodes.

4.5.6.3 Rank Remaining Control Technologies by Effectiveness

Please refer to Section 4.5.1.3 for ranking of control devices for PM control.

4.5.6.4 Evaluate Technically Feasible Control Options

Particulate matter emissions from all these emission sources are currently controlled by associated baghouses. The control efficiency for the WESP and baghouse are similar, with both devices achieving upwards of 99.9% PM removal efficiency. Because the Permittee has selected the top-option for BACT, detailed economic, energy, and environmental information on the lower efficient options is not required.

4.5.6.5 Select BACT for PM Emissions

Baghouses, which are currently installed on these emission sources, are the selected BACT for PM controls. Enviva proposes a maximum emission rate of 0.004 gr/scf as the BACT limit for PM control for these sources controlled via a baghouse. The Permittee will also conduct monitoring, recordkeeping, and reporting to ensure compliance with the BACT limit.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined baghouses are BACT for PM control for the above noted sources and the BACT emission limit for PM is 0.004 gr/scf for these sources.

4.5.7 Green Wood Handling (ID No. IES-GWH)

Fugitive PM emissions result from unloading purchased chips and bark from trucks and hoppers and transferring these materials to the storage piles via conveyors.

4.5.7.1 Identify Control Technologies

Control technologies for the handling of the green wood handling include the following:

- Windscreen barriers
- Reduced drop heights from transfer points
- Use of water spray or wet suppression.

4.5.7.2 Eliminate Technically Infeasible Options

All the identified control options are technically feasible. However, use of water sprays or chemical suppressants would result in notable increases in emissions of criteria pollutants from the dryer due to combustion of additional fuel to remove the added moisture. Therefore, use of water spray or wet suppressants is not considered further.

4.5.7.3 Rank Remaining Control Technologies by Effectiveness

The remaining control options – windscreen barriers and reduced drop heights – have varying degrees of effectiveness depending on additional factors such as wind speed and direction. Therefore, both remaining options are equal in terms of effectiveness.

4.5.7.4 Evaluate Technically Feasible Control Options

Due to the inherently low emissions generated by the green wood handling (0.08 tpy PM), even a modestly low-cost windscreen would be considered cost prohibitive and would not result in a significant reduction in PM emissions. Reducing of drop heights is not possible for the unloading of trucks and reduction of emissions from varying the drop height from the conveyors to the storage piles would result in minimal emission reductions.

4.5.7.5 Select BACT for PM Emissions

Because of the low emissions associated with this source, controls are cost prohibitive or not effective. Therefore, Enviva proposes no control or work practices for BACT for PM emissions from the green wood handling. The NCDAQ concurs with the Permittee’s proposal. The NCDAQ has determined BACT is no control or work practice standards for green wood handling.

4.5.8 Green Wood Storage Piles (ID Nos. IES-GWSP-1 to IES-GWSP-4) and Bark Fuel Storage Piles (ID Nos. IES-BFSP-1 and IES-BFSP-2)

PM emissions from the storage piles are fugitive and occur due to wind erosion.

4.5.8.1 Identify Control Technologies

Control technologies for the storage piles include the following:

- Windscreen barriers
- Use of water spray or wet suppression.

4.5.8.2 Eliminate Technically Infeasible Options

Both the identified control options are technically feasible. However, use of water sprays or chemical suppressants would result in notable increases in emissions of criteria pollutants from the dryer due to combustion of additional fuel to remove the added moisture. Therefore, use of water spray or wet suppressants is not considered further.

4.5.8.3 Rank Remaining Control Technologies by Effectiveness

The only remaining control options is windscreen barriers.

4.5.8.4 Evaluate Technically Feasible Control Options

Due to the inherently low emissions generated by the green wood storage piles (15.9 tpy PM) and bark storage piles (0.64 tpy PM), even a modestly low-cost windscreen would be considered cost prohibitive and would not result in a significant reduction in PM emissions. Enviva provided cost

estimates for a windscreen on the green wood storage piles on the to demonstrate the cost effectiveness of this control option. As shown in the table below, windscreen on the green wood storage piles is not cost-effective.

Control Technology	Emissions (tons/yr)	Emissions Reduction (%)	Emissions Reduction (tpy)	Annual Operating Cost (\$/yr)	Cost - Effectiveness (\$/Ton)
IES-GWSP-1 through 4	15.9	71%	11.3	\$410,720	\$36,346
<u>Notes:</u> The annual operating cost includes maintenance for the windscreen and indirect annual costs, the largest of which is capital recovery.					

4.5.8.5 Select BACT for PM Emissions

Because of the low emissions associated with this source, controls are cost prohibitive or not effective. Therefore, Enviva proposes no control or work practices for BACT for PM emissions from the storage piles. The NCDAQ concurs with the Permittee’s proposal. The NCDAQ has determined BACT is no control or work practice standards for the storage piles.

4.5.9 Bark Fuel Bin (ID No. IES-BFB), Dry Shaving Material Handling (ID No. IES-DRYSHAVE), Debarker (ID No. IES-DEBARK), and Bark Hog (ID No. IES-BARKHOG)

This section discusses BACT for several similar PM emission sources at Enviva. PM emissions from these sources are insignificant (< 5 tpy per 15A NCAC 02Q .0503(8)) and are fugitive in nature. Because of the fugitive nature of these sources, no add-on controls are feasible. The only identified control technology /work practice standard for these emission sources is the use of water spray or wet suppression.

4.5.9.2 Eliminate Technically Infeasible Options

The use of water sprays or chemical suppressants would result in notable increases in emissions of criteria pollutants from the dryer due to combustion of additional fuel to remove the added moisture. Therefore, use of water spray or wet suppressants is not considered further.

4.5.9.3 Rank Remaining Control Technologies by Effectiveness

No control options or work practice standards are identified as technically feasible for these emission sources.

4.5.9.4 Evaluate Technically Feasible Control Options

No control options or work practice standards are identified for these emission sources.

4.5.9.5 Select BACT for PM Emissions

Because of the inherently low PM emissions from these sources and the lack of control options or work practices standards. Enviva proposes no control or work practices for BACT for PM emissions

from these sources. The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined BACT is no control or work practice standards for these emission sources.

4.5.10 Paved Roads (--)

The PM emissions from the paved roads are fugitive, which makes add-on controls from this emission source infeasible. Work practices and pollution prevention are the only feasible means to minimize PM emissions from the paved roads. Based on the review of the RBLC, the following work practices options are considered under the BACT analyses:

- Application of water or wet suppressants;
- Control of vehicle speed
- Good housekeeping and maintenance practices, and
- Vacuuming or sweeping the roadways.

4.5.10.2 Eliminate Technically Infeasible Options

All the control options are considered technically feasible for minimizing PM emissions from paved roads.

4.5.10.3 Rank Remaining Control Technologies by Effectiveness

The control effectiveness for the work practices and pollution prevention options identified vary depending on the frequency of application, treatment, and implementation. However, with proper implementation a combination of the above control options can achieve up to 90% control efficiency.

4.5.10.4 Evaluate Technically Feasible Control Options

As described above, the most effective control for minimizing PM emissions from paved roads is to implement a combination of work practices. Thus, no one work practice is considered the most effective control.

4.5.10.5 Select BACT for PM Emissions

The most effective control for the paved roads is a combination of work practices. Enviva proposes watering of paved roads, vehicle speed control, and good housekeeping as BACT for PM for paved roadways, which will reduce emissions by an estimated 90%.

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined BACT is watering of paved roads, vehicle speed control, and good housekeeping as BACT for PM for paved roads.

4.6 Proposed BACT

Based on the BACT analyses for the PSD project discussed in Sections 4.4 and 4.5 above, the NCDAQ has determined the technology and limitations presented in the following table are BACT for these sources. The BACT permit condition for these emission sources is provided in Attachment 1 to this permit review.

Table 4. Summary of BACT Determinations for the Sampson Plant				
Emission Source	Pollutant	Control Technology or Work Practice	Proposed Emission Limit	Averaging Period
Dryer System (ID No. ES-DRYER) / Green Wood Hammermills (ID Nos. ES-GHM-1 to 3)	VOC	RTO	0.15 lb /ODT	3-hour
	PM	WESP	0.105 lb/ODT (filterable only)	3-hour
Dry Hammermills (ID Nos. ES-HM-1 to ES- HM-8)	VOC	Good Operating Procedures	0.60 lb/ODT	3-hour
	PM	Baghouses	0.004 gr/scf	3-hour
Hammermill Conveying System (ID No. ES-HMC)	PM	Baghouse	0.004 gr/scf	3-hour
Dried Wood Handling (ID No. ES-DWH)	VOC	Good Operating Procedures	0.12 lb/ODT	3-hour
	PM	Baghouses	0.004 gr/scf	3-hour
Pellet Presses and Coolers (ID No. ES-CLR-1 to 6)	VOC	Good Operating Procedures	1.74 lb/ODT	3-hour
	PM	Cyclones - Proper Design and Good Operating Procedures	0.04 gr/scf	3-hour
Pellet Cooler LP Fines Relay System (ID No. ES-PCLP)	PM	Baghouse	0.004 gr/scf	3-hour
Pellet Sampling Transfer Bin (ID No. ES-PSTB)	PM	Baghouse	0.004 gr/scf	3-hour
Hammermill Area/Pellet Cooler HP Fines Relay System (ID No. ES-HMA and ES-PCHP)	PM	Baghouse	0.004 gr/scf	3-hour
Pellet Mill Feed Silo (ID No. ES-PMFS)				
Finished Product Handling/Pellet Loadout Bins/Pellet Mill Loadouts (ID Nos. ES-FPH, ES-PB-1 to 4/ ES-PL-1 and 2)				
Paved Roads --	PM	Combination of watering of paved roads, vehicle speed control, and good housekeeping	Not Applicable	
Green Wood Handling (ID No. IES-GWH)	PM	None	Not Applicable	
Green Wood Storage Piles (ID Nos. IES-GWSP-1 to 4)	VOC			
	PM			
Bark Fuel Storage Piles (ID Nos. IES-BFSP-1 to 2)	VOC			
	PM			
Bark Fuel Bin (ID No. IES-BFB)	PM			
Dry Shavings Material	PM			

Table 4. Summary of BACT Determinations for the Sampson Plant				
Emission Source	Pollutant	Control Technology or Work Practice	Proposed Emission Limit	Averaging Period
Handling (ID No. IES-DRYSHAVE)				
Debarker (ID No. IES-DEBARK-1)	PM			
Log Chipping (ID No. IES-CHIP-1)	VOC			
Bark Hog (ID No. IES-BARKHOG)	VOC			
	PM			

5.0 PSD Air Quality Impact Analysis

The PSD impact analyses described in this section were conducted in accordance with current PSD directives and modeling guidance. References are made to the US EPA, Draft October 1990, New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting, which will herein be referred to as the NSR Workshop Manual.²¹

5.1 Class II Area Significant Impact Air Quality Modeling Analysis

Two pollutants (PM and VOC) exceeded the PSD SER, as shown previously in Table 1, and thus, these pollutants require a PSD analysis. A significant impact analysis was conducted only for ozone precursors (i.e., NO_x and VOC) because project emission increases were below SERs for the other PSD pollutants with Class II Area Significant Impact Levels (SIL).

5.1.1 Class II Area Tier 1 Screening Analysis for Ozone Precursors

A Tier 1 screening analysis was conducted to evaluate project precursor emissions impacts on secondary formation of ozone in Class II areas. The screening analysis was based on methodologies taken from EPA's draft *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program*. MERPs are defined as the screening emission level (tpy) above which project precursor emissions would conservatively be expected to have a significant impact on secondary PM_{2.5} or ozone formation. A MERP value is developed for each precursor pollutant from photochemical modeling validated by EPA and a "critical air quality threshold." The MERPs guidance relies on EPA's 2016 draft SILs for PM_{2.5} and ozone as the critical air quality threshold to develop conservative MERPs values. As such, NO_x and VOC project emissions were assessed by separately derived ozone MERPs values. The project impacts on secondary ozone were determined by summing the VOC project emissions as a percentage of the VOC MERP with the NO_x project emissions as a percentage of the NO_x MERP. A value less than 100% indicates the combined impacts of VOC and NO_x will not exceed the critical air quality threshold. As shown in Table 5, project impacts on 8-hour ozone were below the 100% threshold demonstrating that the project will not cause or contribute to a violation of the NAAQS for ozone.

Precursor	MERP (tpy)	Emission Increase (tpy)	Percentage of MERP
NO _x	170	0	0 %
VOC	1,159	214	18 %
		Total	18 %

5.2 Class II Area Full Impact Air Quality Modeling Analysis

Class II Area NAAQS and PSD Increment full impact analyses were not required because project emission increases were below SERs for PSD pollutants with established NAAQS and Class II Area PSD Increments.

²¹ US EPA. *NSR Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting* (Draft October 1990). Retrieved from <https://www.epa.gov/sites/production/files/2015-07/documents/1990wman.pdf>

5.3 Non-Regulated Pollutant Impact Analysis

5.3.1 NC Air Toxics

All emission sources at Enviva that emit toxic air pollutants (TAPs) are considered by DAQ to be affected sources pursuant to 40 CFR Part 63 because they are subject to either a 112(g) Case-by-Case MACT or a MACT standard under 40 CFR Part 63. Such emission sources are exempt from NC Air Toxics in accordance with 15A NCAC 02Q .0702(a)(27)(b). For this permit application, Enviva (rather than the NCDAQ) has elected to demonstrate that increased TAP emissions associated with the SWEP would not present “an unacceptable risk to human health,” in accordance with G.S. 143-215. 107(b) as codified on May 1, 2014.

An air toxics dispersion modeling analysis was conducted to evaluate ambient impacts of facility-wide TAPs. Emissions rates of TAPs were first compared with their associated TAP permitting emission rate (TPERs) in 15A NCAC 02Q .0711. Nine TAPs exceeded their TPER and were further evaluated in facility-wide modeling.

AERMOD (16216r) was run using surface data from Fayetteville and upper air data from Greensboro for 2016 processed with the adjust u* option. All toxics except acrolein were less than 50% of the AAL, so only acrolein was run using the five-year set from 2012-2016. Direction-specific building dimensions, determined using EPA’s BPIP-Prime program (04274), were used as input to the model for building wake effect determination. EPA’s AERMAP terrain processor was used to determine elevations. Receptors were spaced at 25 meters around the ambient boundary, at 100-meter intervals out to 800 meters, and at 500-meter intervals out to 10,000 meters from the facility.

The results of the modeling are provided in the table below. The modeling adequately demonstrates compliance on a source-by-source basis for all TAPS modeled. Therefore, the proposed SWEP will not present an “an unacceptable risk to human health,” and no modeled emission limits will be included in the permit.

Pollutant	Averaging Period	Maximum Impact ($\mu\text{g}/\text{m}^3$)	AAL ($\mu\text{g}/\text{m}^3$)	% of AAL
Acrolein	1-hour	66.9	80	84
Arsenic	Annual	1E-5	0.0021	<1
Benzene	Annual	5.3E-3	0.12	5
Cadmium	Annual	2.11E-6	0.0055	<1
Chlorine	1-hour	0.14	900	<1
	24-hour	0.046	37.5	<1
Formaldehyde	1-hour	42.4	150	28
Hydrogen Chloride	1-hour	0.33	700	<1
Manganese	24-hour	6.8E-3	31	<1
Phenol	1-hour	33.3	950	4
Notes: Emissions factors for certain TAPs (including acrolein, formaldehyde, and phenol) are in lb/ODT. Emissions were calculated for these TAPs using the maximum short-term throughput for a worst-case emission estimate.				

The air dispersion modeling above did not account for the scenario of the furnace or dryer during bypass mode. The worst-case TAP concentration was for acrolein, with a maximum modeled

concentration that was 83.7% of the 1-hour AAL. The maximum potential hourly emissions of acrolein from the furnace bypass stack are approximately 39% of the potential acrolein emissions from the dryer line RTO stack during normal operation. Given the relative magnitude of the furnace bypass emissions and the fact that emissions will not be exiting the RTO stack and the furnace bypass stack simultaneously, the NCDAQ does not anticipate the bypass scenario will impact the overall modeling results. However, the NCDAQ has requested Enviva to conduct revised air modeling to include the bypass scenarios.

5.3.2 SAAQS

Emissions of PM from the SWEP were estimated above the SER of 25 tpy as specified under 40 CFR 51.166(b)(23), as shown previously in Table 1. While the total suspended particulate (TSP) NAAQS was revised in 1987 to narrow focus and regulation to PM10, North Carolina State Ambient Air Quality Standards (SAAQS) currently still require evaluation of both PM10 and TSP separately in accordance with 15A NCAC 02D .0403. As such, Enviva modeled facility-wide TSP project emissions using AERMOD and the same model setup as the TAPs modeling analyses to show project impacts were below the 24-hour and annual SAAQS as shown in Table 7.

Table 7. Results of TSP SAAQS Modeling			
Averaging Period	Modeled Concentration (µg/m³)	SAAQS (µg/m³)	Exceeds SAAQS?
24-Hour	145	150	No
Annual	20.9	75	No

The air dispersion modeling did not account for the scenario of the furnace or dryer during bypass mode. The 24-hour average TSP emission rate for the furnace bypass stack is slightly less than the modeled TSP emission rate for the RTO stack during normal operations (7.22 lb/hr vs. 7.60 lb/hr, respectively). Given the relative magnitude of the furnace bypass emissions, it is anticipated that modeled concentrations for the furnace bypass scenario would be approximately the same as the modeled concentrations for normal operation. As noted above, the NCDAQ has requested Enviva to conduct revised air modeling to include the bypass scenarios.

5.4 Additional Impact Analysis

Additional impact analyses were conducted for ozone, growth, soils and vegetation, and visibility impairment.

5.4.1 Growth Impacts

The Enviva Sampson plant is an existing facility and no permanent jobs will be added due to the proposed project. Therefore, this project is not expected to cause a significant increase in growth in the area.

5.4.2 Soils and Vegetation

The impact on soils and vegetation was conservatively estimated by comparing the first high modeled 24-hour TSP concentration to the 24-hour secondary NAAQS for PM₁₀. As shown in Table 8, the Enviva project is not expected to cause any detrimental impacts to soil or vegetation in the area.

Averaging Period	Modeled TSP Concentration ($\mu\text{g}/\text{m}^3$)	Secondary PM₁₀ NAAQS ($\mu\text{g}/\text{m}^3$)	Exceeds Secondary NAAQS?
24-hour	145	150	No

5.4.3 Class II Visibility Impairment Analysis

A Class II visibility impairment analysis was not conducted because there are not any visibility sensitive areas within the Class II Significant Impact Area.

5.5 Class I Area - Additional Requirements

Three Federal Class I Areas are located within 300 km of the Enviva project – Swanquarter NWR, James River Face Wilderness, and Cape Romain National Wildlife Refuge. The Federal Land Manager for each of those areas was contacted and none of them required any analysis. Thus, no analysis was conducted.

5.5.1 Class I Area Significant Impact Level Analysis

A Class I Area significant impact screening analysis was not required because project emission increases were below SERs for PSD pollutants with established Class I PSD Increments.

5.5.2 Class I Increment/Air Quality Related Values (AQRV) Regional Haze Impact and Deposition Analyses

The project does not include significant emissions of pollutants with established Class I Area Increments or Deposition Analysis Thresholds. The project also does not include significant emissions of visibility-impairing pollutants such as NO_x, SO₂, PM_{2.5}, and PM₁₀. Therefore, analysis of project impacts on Class I Area Air Quality Related Values (AQRVs) was not required.

5.6 PSD Air Quality Modeling Result Summary

Based on the PSD air quality ambient impact analysis performed, the proposed Enviva Pellets Sampson, LLC modification will not cause or contribute to any violation of the Class II NAAQS, PSD increments, Class I increments, or any FLM AQRVs.

6.0 Other Issues

6.1 Compliance

NCDAQ has reviewed the compliance status of Enviva. Greg Reeves of FRO conducted the most recent compliance inspection at the facility on March 29, 2018. The Permittee appeared to be operating in compliance during the inspection, with the exception of emission exceedances as addressed in the SOC.

The Permittee has had the following compliance issues within the past five years:

- On February 3, 2017, Enviva was issued a Notice of Violation (NOV) for recordkeeping violations observed during an inspection on January 26, 2017
- On November 3, 2017, Enviva was issued a Notice of Violation/Notice of Recommendation for Enforcement (NOV/NRE) for exceeding the BACT emission limit for CO. During stack testing conducted April 18-19, 2017, the lowest three consecutive-run average of CO emissions was 0.224 pounds per million Btu, which exceeded the BACT limit of 0.21 pounds per million Btu.
- On March 5, 2018, Enviva was assessed a civil penalty in the amount of \$5,333, including investigation costs, for the CO emission exceedance. The civil penalty was paid in full on March 26, 2018.
- On June 5, 2018, Enviva was issued a NOV/NRE for exceeding the BACT emission limit for VOC. During stack testing conducted March 29, 2018, the three-run average VOC emissions was 1.21 pounds per ODT, which exceeded the BACT emission limit of 1.07 pounds per ODT.
- On September 21, 2018, the NCDAQ and Enviva finalized an SOC addressing the exceedance of the BACT emission limit for VOC. The SOC will expire upon the issuance of the air permit containing revised BACT limits or on December 31, 2019, whichever is sooner.

6.2 Zoning Requirements

A local zoning consistency determination is required. A copy of the zoning consistency determination dated March 19, 2018 from the Clinton-Sampson Planning Department was received on March 22, 2018.

6.3 Professional Engineer's Seal

A Professional Engineer's seal was included with the application. Russell Kemp of RESU Engineers, P.C, is a Professional Engineer currently registered in the State of North Carolina. Mr. Kemp sealed the application for the portions containing the engineering plans, calculations, and all supporting documentation.

6.4 Application Fee

An application fee in the amount of \$14,762.00 was received. The amount of \$14,359.00 was received with the PSD permit application on March 19, 2018, and the remaining \$403.00 was received on April 3, 2018.

6.5 Public Participation Requirements

In accordance with 40 CFR 51.166(q), public participation, the reviewing authority (NCDAQ) shall meet the following:

- 1) Make a preliminary determination whether construction should be approved, approved with conditions, or disapproved.

This document satisfies this requirement providing a preliminary determination that construction should be approved consistent with the permit conditions described herein.

- 2) Make available in at least one location in each region in which the proposed source would be constructed a copy of all materials the applicant submitted, a copy of the preliminary determination, and a copy or summary of other materials, if any, considered in making the preliminary determination.

This preliminary determination, application, and draft permit will be made available in the Fayetteville Regional Office and in the Raleigh Central Office, with the addresses provided below.

Fayetteville Regional Office	Raleigh Central Office
System Building	217 West Jones Street
225 Green Street, Suite 714	Raleigh, NC 27603
Fayetteville, NC 28301	

In addition, the preliminary determination and draft permit will be made available on the NCDAQ public notice webpage.

- 3) Notify the public, by advertisement in a newspaper of general circulation in each region in which the proposed source would be constructed, of the application, the preliminary determination, the degree of increment consumption that is expected from the source or modification, and of the opportunity for comment at a public hearing as well as written public comment.

The NCDAQ prepared a public notice (See Attachment 2) that will be published in a newspaper of general circulation in the region.

- 4) Send a copy of the notice of public comment to the applicant, the Administrator and to officials and agencies having cognizance over the location where the proposed construction would occur as follows: Any other State or local air pollution control agencies, the chief executives of the city and county where the source would be located; any comprehensive regional land use planning agency, and any State, Federal Land Manager, or Indian Governing body whose lands may be affected by emissions from the source or modification.

The NCDAQ will send the public notice (See Attachment 2) to the Sampson County manager at 406 County Complex Rd., Bldg C, Suite 110, Clinton, NC 28328.

- 5) Provide opportunity for a public hearing for interested persons to appear and submit written or oral comments on the air quality impact of the source, alternatives to it, the control technology required, and other appropriate considerations.

The NCDAQ public notice (See Attachment 2) provides contact information to allow interested persons to submit comments and/or request a public hearing.

7.0 Conclusion

Based on the application submitted and the review of this proposal, the NCDAQ is making a preliminary determination that the project can be approved and a revised permit issued. After consideration of all comments, a final determination will be made.

Attachment 1

Permit Condition for BACT for the SWEP at Enviva Pellets Sampson, LLC

1. 15A NCAC 02D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

- a. The Permittee shall comply with all applicable provisions, including the notification, testing, reporting, recordkeeping, and monitoring requirements in accordance with 15A NCAC 02D .0530, “Prevention of Significant Deterioration of Air Quality” as promulgated in 40 CFR 51.166.
- a. The following emission limits shall not be exceeded except during periods of start-up, shut-down, or malfunction:

Emission Source	Pollutant	Control Technology or Work Practice	BACT Emission Limit	Averaging Period
Wood-fired Direct Heat Drying System (ID No. ES- DRYER)	NOx	Good Combustion Practices	0.20 lb/MMBtu	3-hour
	CO	Process Design	0.21 lb/MMBtu	3-hour
	GHG	Good Operating Practices	230,000 tpy (CO ₂ e)	Annual
Wood-fired Direct Heat Drying System (ID No. ES- DRYER) Green Wood Hammermills (ID Nos. ES-GHM-1 to 3)	VOC**	RTO	0.15 lb /ODT	3-hour
	PM/PM10/2.5	WESP	0.105 lb/ODT (filterable only)	3-hour
Dry Hammermills (ID Nos. ES-HM-1 to ES- HM-8)	VOC**	Good Operating Procedures	0.60 lb/ODT	3-hour
	PM	Baghouse	0.004 gr/scf	3-hour
	PM10		0.004 gr/scf (filterable only)	3-hour
	PM2.5		0.000014 gr/scf (filterable only)	3-hour
Hammermill Conveying System (ID No. ES-HMC)	PM	Baghouse	0.004 gr/scf	3-hour
Dried Wood Handling (ID No. ES-DWH)	VOC**	Good Operating Procedures	0.12 lb/ODT	3-hour
	PM	Baghouses	0.004 gr/scf	3-hour
Pellet Presses and Coolers (ID No. ES-CLR-1 to 6)	VOC**	Good Operating Procedures	1.74 lb/ODT	3-hour
	PM	Cyclones - Proper Design and Good Operating Procedures	0.04 gr/scf	3-hour
	PM10		0.0057 gr/scf (filterable only)	3-hour
	PM2.5		0.0007 gr/scf (filterable only)	3-hour
Pellet cooler LP Fines Relay System (ID No. ES-PCLP)	PM2.5/PM10/PM	Baghouse	0.004 gr/scf	3-hour
Pellet Sampling Transfer Bin (ID No. ES-PSTB)	PM2.5/PM10/PM	Baghouse	0.004 gr/scf	3-hour
Hammermill Area/Pellet cooler HP Fines Relay System (ID No. ES-HMA and ES-PCHP)	PM2.5/PM10/PM	Baghouse	0.004 gr/scf	3-hour

Emission Source	Pollutant	Control Technology or Work Practice	BACT Emission Limit	Averaging Period
Pellet Mill Feed Silo (ID No. ES-PMFS)	PM2.5/PM10/PM	Baghouse	0.004 gr/scf	3-hour
Finished Product Handling/Pellet Loadout Bins/Pellet Mill Loadouts (ID Nos. ES-FPH, ES-PB-1 to 4/ ES-PL-1 and 2)	PM	Baghouse	0.004 gr/scf	3-hour
	PM10	Baghouse	0.004 gr/scf	3-hour
	PM2.5	Baghouse	0.000014 gr/scf	3-hour
Paved Roads --	PM/PM10/PM2.5	Combination of watering of paved roads, vehicle speed control, and good housekeeping	Not Applicable	
Green Wood Handling (ID No. IES-GWH)	PM/PM10/PM2.5	None	Not Applicable	
Green Wood Storage Piles (ID Nos. IES-GWSP-1 to 4)	VOC			
Bark Fuel Storage Piles (ID Nos. IES-BFSP-1 to 2)	PM/PM10/PM2.5			
	VOC			
Bark Fuel Bin (ID No. IES-BFB)	PM/PM10/PM2.5			
Dry Shavings Material Handling (ID No. IES-DRYSHAVE)	PM			
Debarker (ID No. IES-DEBARK-1)	PM/PM10/PM2.5			
Log Chipping (ID No. IES-CHIP-1)	VOC			
Bark Hog (ID No. IES-BARKHOG)	VOC			
	PM			
Diesel storage tanks	VOC	Good operation practices	Not Applicable	

* BACT emission limits shall apply at all times except the following: Emissions resulting from start-up, shutdown or malfunction above those given in this table are permitted provided that optimal operational practices are adhered to and periods of excess emissions are minimized.

** The VOC limit is expressed as alpha pinene basis per the procedures in EPA OTM 26.

Notifications [15A NCAC 02Q .0308(a)]

- b. The completion of the Softwood Expansion Project (SWEP) is defined as the replacement of pellet presses that allow throughput of up to 657,000 ODT/year on an annual basis and the rerouting of the exhaust from the green wood hammermills (ID Nos. ES-GHM-1, ES-GHM-2, and ES-GHM-3) to the wet electrostatic precipitator (ID No. CD-WESP) and the regenerative thermal oxidizer (ID No. CD-RTO). The Permittee shall notify the DAQ of the actual completion date of the SWEP postmarked within 15 days after such date.

Testing [15A NCAC 02Q .0308(a)]

- d. **Initial Performance Tests** – Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the BACT emission limits in Section 2.2 A.1.b above 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 through 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). Initial testing shall be conducted in accordance with the following:

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

Emission Sources	Pollutant
Dryer system/green wood hammermills controlled via WESP and RTO	VOC
	PM/PM10/PM2.5
	NO _x
	CO
One pellet cooler cyclone	VOC
	PM/PM10/PM2.5
One dry hammermill baghouse	VOC
	PM/PM10/PM2.5
Dry wood handling operations	VOC

- ii. The Permittee shall conduct initial compliance testing in accordance with a testing protocol approved by the DAQ.
- iii. The Permittee shall submit a protocol to DAQ at least 45 days prior to initial compliance testing and shall submit a notification of initial compliance testing at least 15 days in advance of the testing.
- iv. The RTO (**ID No. CD-RTO**) is comprised of two fireboxes, each containing two temperature probes. During the initial compliance test, the Permittee shall establish the minimum average firebox temperature for each of the two fireboxes comprising the regenerative thermal oxidizer (**ID No. CD-RTO**), for a total of two average temperatures per regenerative thermal oxidizer. “Average firebox temperature” means the average temperature of the two temperature probes in each firebox. The minimum average firebox temperature for each firebox shall be based upon the average temperature of the two temperature probes over the span of the test runs. Documentation for the minimum average firebox temperature for each firebox shall be submitted to the DAQ as part of the initial compliance test report.
- v. Initial compliance testing shall be completed as follows:
- (A) The Permittee shall be responsible for ensuring, within practicable limits, that the equipment or processes being tested are operated at or near the maximum normal production rate but at a rate not to exceed 71.71 ODT/hr (not to exceed 537,625 ODT/year on an annual basis).
- (B) Testing shall be conducted at the maximum normal operating softwood percentage, not to exceed 80% softwood.
- (C) Testing shall be completed and results submitted to the DAQ within 90 days of permit issuance, unless an alternate date is approved in advance by DAQ.
- vi. Additional initial compliance testing upon completion of the SWEP shall be completed as follows:
- (A) The Permittee shall be responsible for ensuring, within practicable limits, that the equipment or processes being tested are operated at or near the maximum normal production rate but at a rate not to exceed 120 ODT/hr (not to exceed 657,000 ODT/year on an annual basis).
- (B) Testing shall be conducted at the maximum normal operating softwood percentage, not to exceed 80% softwood.
- (C) Testing shall be completed and results submitted to the DAQ within 120 days completion of the construction of the SWEP, unless an alternate date is approved in advance by DAQ,
- e. Periodic Performance Tests – Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the BACT emission limits in Section 2.2 A.1.b above by conducting periodic performance tests 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 through ES-HM-8**), and the pellet presses and coolers (**ID Nos. ES-CLR-1 through ES-CLR-6**). Periodic testing shall be conducted in accordance with the following:
- i. The pollutants and emission sources to be tested during the periodic performance tests are listed in the following table:

Emission Sources	Pollutant
Dryer system/green wood hammermills controlled via WESP and RTO	VOC
	PM/PM10/PM2.5
	NOx
	CO
One pellet cooler cyclone	VOC
	PM/PM10/PM2.5
One dry hammermill baghouse	VOC
	PM/PM10/PM2.5

- ii. The Permittee shall conduct periodic compliance testing in accordance with a testing protocol approved by the DAQ.
- iii. The Permittee shall submit a protocol to DAQ at least 45 days prior to periodic compliance testing and shall submit a notification of periodic compliance testing at least 15 days in advance of the testing.
- iv. The Permittee shall be responsible for ensuring, within practicable limits, that the equipment or processes being tested are operated at or near the maximum normal production rate.
- v. To the extent possible, testing shall be conducted at the maximum normal operating softwood percentage.
- vi. The Permittee shall conduct periodic performance tests when the following conditions are met:
 - (A) The monthly average softwood content exceeds the average softwood percentage documented during prior performance testing by more than 10 percentage points, or
 - (B) The monthly production rate exceeds the average production rate documented during prior performance testing by more than 10 percentage points, or
 - (C) At a minimum testing shall be conducted annually, unless a longer duration is otherwise approved pursuant to Section 2.2.A.1.e.x. Annual performance tests shall be completed no later than 13 months after the previous performance test.
- vii. The Permittee shall notify the DAQ within 15 days when the conditions specified in Section 2.2 A.1.e.vi (A) or (B) are met.
- viii. The Permittee shall conduct the periodic performance test and submit a written report of the test results to the DAQ within 90 days from the date the monthly softwood content or overall production rate increased as described in Section 2.2 A.1.e.vi (A) and (B) above, unless an alternate date is approved in advance by DAQ,
- ix. When periodic performance testing has occurred at 90 percent softwood AND at 90 percent of the maximum permitted throughput, subsequent periodic performance testing shall occur on an annual basis and shall be completed no later than 13 months after the previous performance test, unless a longer duration is otherwise approved pursuant to Section 2.2.A.1.e.x.
- x. The Permittee may request that the performance tests be conducted less often for a given pollutant if the performance tests for at least 3 consecutive years show compliance with the emission limit. If the request is granted, the Permittee shall conduct a performance test no more than 36 months after the previous performance test for the given pollutant.
- xi. If a performance test shows noncompliance with an emission limit for a given pollutant, the Permittee shall return to conducting annual performance tests (no later than 13 months after the previous performance test) for that pollutant.
- xii. Except as specified in Section 2.2 A.1.e.viii above, the Permittee shall submit a written report of results for any periodic performance test to the DAQ, not later than 30 days after sample collection, in accordance with 15A NCAC 02D .2602(h).
- xiii. The Permittee may re-establish any parametric operating value during periodic testing. Compliance with previously approved parametric operating values is not required during periodic required testing or other tests undertaken to re-establish parametric operating values by the Permittee. If the new parametric operating values re-established during periodic testing are more stringent, the Permittee shall submit a request to revise the value(s) in the permit at the same time the test report required pursuant to General Condition 17 is submitted. The permit revision will be processed pursuant to 15A NCAC 02Q .0514. If, during performance testing, the new parametric operating values are less

stringent, the Permittee may request to revise the value(s) in the permit pursuant to 15A NCAC 02Q .0515.

xiv. The Permittee shall comply with applicable emission standards at all times, except as allowed by Section 2.2 A.1.b, including during periods of testing.

Monitoring/Recordkeeping [15ANCAC 02Q .0308(a)]

- f. Regardless of the actual completion date of the SWEP, the Permittee shall complete the rerouting of the exhaust from green wood hammermills (**ID Nos. ES-GHM-1, ES-GHM-2, and ES-GHM-3**) to the wet electrostatic precipitator (**ID No. CD-WESP**) and the regenerative thermal oxidizer (**ID No. CD-RTO**) within twelve (12) months of permit issuance.
- g. The Permittee shall not increase production beyond 537,625 oven-dried tons (ODT) of pellets per consecutive 12-month period (the permitted maximum production rate in Air Permit No. 10386R03) until exhaust from the green wood hammermills (**ID Nos. ES-GHM-1, ES-GHM-2, and ES-GHM-3**) has been rerouted to the wet electrostatic precipitator (**ID No. CD-WESP**) and the regenerative thermal oxidizer (**ID No. CD-RTO**).
- h. Upon completion of the SWEP, the Permittee shall not process more than 657,000 ODT of pellets per consecutive 12-month period. The process rate shall be recorded monthly in a logbook (written or electronic format) kept on-site and made available to an authorized representative upon request.
- i. Upon completion of the SWEP, the Permittee shall not process more than 558,450 ODT of pellets per consecutive 12-month period (85% of the permitted maximum production rate of 657,000 ODT per consecutive 12-month period) from the eight dry hammermills (**ID Nos. ES-HM-1 through ES-HM-8**). The dry hammermill process rate shall be recorded monthly in a logbook (written or electronic format) kept on-site and made available to an authorized representative upon request.
- j. The Permittee shall record the hardwood/softwood mix monthly in a logbook (written or electronic format) kept on-site and made available to an authorized representative upon request.
- k. The Permittee shall calculate the total emissions of NO_x, filterable PM, CO, and VOC monthly and shall record the emissions monthly in a logbook (written or electronic format) kept on-site and made available to DAQ personnel upon request.
- l. For the wood-fired direct heat drying system (**ID No. ES-DRYER**), GHG (CO₂e) emissions shall be calculated monthly and compliance demonstrated using the applicable Part 98 emission factors. Compliance shall be documented on a 12-month rolling basis.
- m. To ensure compliance and effective operation of the RTO (**ID No. CD-RTO**), the Permittee shall maintain a 3-hour rolling average firebox temperature for each of the two fireboxes comprising the RTO at or above the minimum average temperatures established during the most recent performance testing. The Permittee shall maintain records of the 3-hour rolling average temperatures for each firebox. The Permittee shall also perform inspections and maintenance on the RTO as specified above in Section 2.1 A.1.h.
- n. To ensure compliance and effective operation of the wet electrostatic precipitator (**ID No. CD-WESP**), the Permittee shall perform inspections and maintenance as specified above in Section 2.1 A.1.h. The Permittee shall also maintain the minimum secondary voltage and minimum current of the wet electrostatic precipitator as specified above in Section 2.1 A.1.g.
- o. To ensure compliance and effective operation of the baghouses and cyclones, the Permittee shall perform inspections and maintenance as specified above in Section 2.1 A.1.e.
- p. Monitoring and recordkeeping are not required for the following emission sources:
 - i. Paved roads;
 - ii. VOC emissions from storage tanks; and
 - iii. Emission sources with no BACT emission limits or work practice standards.

Reporting [15A NCAC 02Q .0308(a)]

- q. The Permittee shall submit the results of any maintenance performed on the wet electrostatic precipitator, regenerative thermal oxidizer, cyclones, and/or baghouses within 30 days of a written request by the DAQ.

Attachment 2

Public Notice for Enviva Pellets Sampson, LLC

**NOTICE FOR PUBLIC MEETING AND HEARING
PRELIMINARY DETERMINATION REGARDING APPROVAL OF
AN AIR PERMIT APPLICATION SUBMITTED UNDER THE “REGULATIONS FOR THE
PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY”
FOR
ENVIVA PELLETS SAMPSON, LLC**

Enviva Pellets Sampson, LLC has applied to the North Carolina Department of Environmental Quality, Division of Air Quality for the installation of Best Available Control Technology on emission sources and an increase of production to 657,000 ODT per year associated with a Softwood Expansion Project at its wood pellet manufacturing facility located at:

5 Connector Road, US 117
Faison, NC 28341
Sampson County

The proposed project is subject to review and processing under North Carolina Administrative Code (NCAC), Title 15A, Subchapter 02D.0530, “Prevention of Significant Deterioration.” The proposed project is defined as a “major modification” for the discharge of significant quantities of particulate matter and volatile organic compounds.

Enviva Pellets Sampson, LLC's application has been reviewed by the Division of Air Quality, Raleigh Central Office to determine compliance with the requirements of the North Carolina Environment Management Commission air pollution regulations. The results of that review led to the preliminary determination that the proposed project could be approved and the Division of Air Quality permit could be issued, if certain permit conditions are met.

This notice serves as a Notice of Public Meeting and Hearing and Opportunity for Public Comment for this proposal. The Public meeting and hearing will be held at the Sampson Community College, Activity Center, 1801 Sunset Ave., Clinton, NC 28328 on July 15, 2019 beginning at 6:30 p.m. (meeting) and 7:00 p.m. (hearing).

A copy of all data and the application submitted by Enviva Pellets Sampson, LLC and other material used by the Division of Air Quality in making this preliminary determination are available for public inspection during normal business hours at the following locations:

NC DEQ		Fayetteville Regional Office
Division of Air Quality	or	System Building
Air Permits Section		225 Green Street, Suite 714
217 West Jones Street, Suite 4000		Fayetteville, NC 28301-5094
Raleigh, NC 27603		

Information on the proposed permit, the permit application, and staff review is posted in the DAQ website and is also available by writing or calling:

Betty Gatano, P.E.

NC DEQ
Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699 1641
Telephone: 919 707 8736

Interested persons are invited to review these materials and submit written comments to Betty Gatano at the above address or to present oral or written comments at the Public Hearing. Persons wishing to present oral comments at the hearing should prepare their presentation to be three minutes or less. The public comment period begins on June 12, 2019 and will run through July 19, 2019.

Written comments may also be submitted during the public comment period via email at the following address:

DAQ.publiccomments@ncdenr.gov

Please type "Enviva Sampson.18A" in the subject line.

After weighing all relevant comments received by July 19 2019, and other available information on the project, the Division of Air Quality will act on the Enviva Pellets Sampson, LLC PSD application.

William D. Willets, P.E., Chief, Permitting Section
Division of Air Quality, NCDEQ