NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: February 2, 2023

Region: Washington Regional Office
County: Hertford
NC Facility ID: 4600107
Inspector's Name: Kurt Tidd
Date of Last Inspection: 03/15/2022
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Enviva Pellets, LLC - Ahoskie Plant

Facility Address:
Enviva Pellets, LLC - Ahoskie Plant
142 NC Route 561 East
Ahoskie, NC 27910

SIC: 2499 / Wood Products, Nec
NAICS: 321999 / All Other Miscellaneous Wood Product Manufacturing

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 15A NCAC 02D .0515, .0516, .0521, .0524, .0540, .0614, .1100, .1111, .1806, 02Q .0711, 02Q .0317 of 02D.0530, and 02Q. 0317 of 02D. 1112
NSPS: IIII
NESHAP: ZZZZ
PSD: N/A
PSD Avoidance: Less than 250 tpy VOC, CO, NO_X, and $PM/PM_{10}/PM_{2.5}$
NC Toxics: phenol, manganese, HCL, chlorine, formaldehyde, cadmium, , benzene, arsenic, acrolein hexachlorodibenzo-p-dioxin
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Angie Wilson EHS Manager (252) 908-3541 142 NC Route 561 East Ahoskie, NC 27910	Bryan Grissett Plant Manager (252) 933-9175 142 NC Route 561 East Ahoskie, NC 27910	Joe Harrell Senior Manager, Environmental (252) 370-3181 142 NC Route 561 East Ahoskie, NC 27910

Application Data

Application Number: 4600107.20B, 4600107.17A
Date Received: 09/02/2020 and amended 12/23/2021, 8/14/2017
Application Type: Renewal and Modification/ 502(b)(10)
Application Schedule: TV-Renewal

Existing Permit Data

Existing Permit Number: 10121/T05
Existing Permit Issue Date: 04/25/2022
Existing Permit Expiration Date: 02/28/2027

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2020	17.98	112.91	272.13	41.60	109.87	23.10	8.95 [Methanol (methyl alcohol)]
2019	17.98	108.07	271.74	39.83	109.47	24.54	9.49 [Methanol (methyl alcohol)]
2018	18.07	113.93	275.82	41.99	110.42	25.99	9.98 [Methanol (methyl alcohol)]
2017	17.84	106.76	259.38	39.35	108.55	18.91	7.59 [Methanol (methyl alcohol)]
2016	17.90	96.87	235.83	35.76	108.30	21.24	8.24 [Methanol (methyl alcohol)]

Review Engineer: Richard Simpson

Review Engineer's Signature: *Richard Simpson* **Date:** *February 2, 2023*

Comments / Recommendations:
Issue: 10121/T06
Permit Issue Date: February 2, 2023
Permit Expiration Date: January 31, 2028

I. Introduction and Purpose of Application

Enviva Pellets, LLC – Ahoskie Plant (referred to as EnvivaAHO or Ahoskie throughout this document) currently holds Air Permit No. 10121T05 with an expiration date of February 28, 2027 for a wood pellets manufacturing plant in Ahoskie, Hertford County, North Carolina. The purpose of this permitting action is for the processing of two applications: 502(b)(10) change pursuant to 15A NCAC 02Q .0523 and renewal of the existing Title V permit pursuant to 15A NCAC 02Q .0513 with modifications. The permit applications were complete on, August 14, 2017and September 2, 2020 (as amended December 23, 2021). The December 23, 2021 amended renewal application replaces all other versions of the previous application.

The renewal application was received at least nine months prior to the expiration date. Therefore, the existing permit shall not expire until the renewal permit has been issued or denied. All terms and conditions of the existing permit shall remain in effect until the renewal permit has been issued or denied. This modification portion of the renewal application will also be processed in accordance with 15A NCAC 02Q .0501(c)(1) and will go through a 30 day public notice and a 45 day EPA review at this time. This permit action will address the following sources and control devices associated with the applications:

A. The plant is currently permitted to annually process wood up to 420,480 oven-dried tons (ODT) from the wood-fired dryer system and up to 357,408 oven-dried tons (ODT) from the dry wood hammermill system with both systems utilizing up to 30% softwood on a 12-month rolling basis. The plant is currently permitted to annually process wood up to 481,800 oven-dried tons (ODT) of pellets utilizing up to 45% softwood on a 12-month rolling basis. The plant consists of green wood hammermills, bark hog, wood-fired rotary dryer, dried wood handling, dry hammermills, pellet presses and coolers, product loadout operations, and other ancillary activities.

B. Application 4600107.17A was submitted on August 14, 2017 to replace the integral wood dryer transfer cyclone with a similar dryer cyclone. On August 23, 2017, a Division of Air Quality (DAQ) Notification Acknowledgement letter was sent to the facility confirming the request qualifies as a 502(b)(10) change per 15A NCAC 02Q .0523.

C. Application 4600107.20B was submitted on September 1, 2020 and complete with payment on September 2, 2020. The application incorporated emission reduction efforts to comply with 15A NCAC 02Q .0317 Avoidance Conditions for 15A NCAC 02D .0530: Prevention of Significant Deterioration and 15A NCAC 02Q .0317 Avoidance Condition for 15A NCAC 02D .1112 112(g) Case-by-Case Maximum Available Control Technology (MACT) Standards for HAPs. After additional control devices are installed per proposed permit 10121T06 Sections 2.2 A.2 and 3, the facility will be permitted to increase potential facility wood from the dryer at 550,000 ODT per year, final product throughput to 630,000 ODT per year, and increased softwood percentages to 100%.

D. An amended version for application 4600107.20B was received on December 23, 2021 and replaces any other version. The amended version was a response for a September 30, 2021 additional information letter by DAQ along with updates to process equipment, emission factors, emissions modeling, and monitoring parameters. Detailed updates are located in the Table of Changes in Section 3.

II. History/Background/Application Chronology

July 6, 2016 - First time Title V permit No. 10121T04 was issued.

September 1-2, 2020 - Permit application 4600107.20B was received for several modifications and a permit acknowledgement was sent to the facility to confirm completion of the application and payment.

September 30, 2020 - DAQ permitting engineer requested the facility for additional information regarding Compliance Assurance Monitoring (CAM), emission factor origination, updated flow diagram and process information. A response was requested within 30 days.

January 5-20, 2021 - DAQ permitting Supervisors were requested by the Permitting Section engineer Richard Simpson to comment on the draft permit and review. Comments were received and included in the permit.

October 27, 2021 - The facility requested an extension to the additional information request since it would replace the previous application with an updated version. A 60 day extension was approved.

December 23, 2021 - January 19, 2022 – The facility sent the amended version which included new emissions modeling and sources. DAQ requested the electronic files associated with the application and potential HAP emissions and the facility responded.

February 21, 2022 - DAQ requested CAM information related to the additional information letter. The facility response was in a hard copy and the electronic file was submitted.

March 15-16, 2022 – A compliance inspection was performed by WaRO representative Kurt Tidd. The conclusion of the inspection was: "The facility appeared to be operating in compliance with all applicable Federal and State rules, regulations, and permit conditions at the time of the inspection."

April 4, 2022 - DAQ modeling information was requested from the facility. The facility responded appropriately.

April 18-26, 2022 – After internal review, DAQ edits were made to the modeling review and the modeling was approved.

April 25, 2022 - Title V permit No. 10121T05 was issued for an associated ownership/name change. The permit's expiration date was changed to 2027 per current permitting processing for applications processed after original expiration dates had been surpassed (with timely renewals in house).

April 29 – May 24, 2022 - The Washington Regional Office, the Stationary Source Compliance Branch, and Permits supervisor were requested by the permitting engineer to comment on the draft permit and review. Comments were received and included in the permit from DAQ.

May 25 – June 7, 2022 – The facility was requested by the Permitting Section to comment on the draft permit and review. Comments were received and included in the permit. Details of comments are included in Section IX of this review.

June 21-27, 2022 – Comments were received from Permits Chief and Supervisor and implemented into the draft permit and review. The facility was provided a draft of the permit and review before public notice.

July 13, 2022 – On Wednesday July 13, 2022, a notice of public hearing was published in the Roanoke Chowan News Herald and on the DAQ website. A public hearing was scheduled for August 16, 2022. The public comment period ended August 29, 2022. Copies of the permit application review and draft air permit were made available for public review. Public comments were received.

September 27, 2022 - The DEQ Environmental Justice and Equity Advisory Board (EJEAB) called for a special meeting to discuss the wood biomass industry in NC.

September 28, 2022 – The public hearing officer's report was prepared and signed by DAQ's compliance supervisor engineer, Denise Hayes.

September 28, 2022 – The public hearing officer's report was approved by DAQ's Deputy Director, Michael Abraczinskas.

September 29 - November 13, 2022 – DRAFT permit was sent to the EPA for review. Estelle Bae from the EPA Region 4 responded by email: "Thank you for the opportunity to review Enviva - Ahoskie. The permits looks good. We don't have any comments from the reading through the permit or from the hearing officer's report." The required 45-day EPA review period ended.

November 17, 2022 – An EJEAB held a special meeting. Public comments were received.

November 22, 2022 – The EJEAB sent a letter to DEQ Secretary Elizabeth Biser with their recommendations for the wood biomass industry. A request was made to delay the issuance of the Ahoskie permit.

December 19, 2022 – Title V Equipment Editor (TVEE) changes were approved by Jenny Sheppard TVEE Coordinator.

January 27, 2023 – Secretary Elizabeth Biser sent a signed response letter to the EJEAB.

February 2, 2023 – Permit 10121T06 was signed and issued.

III. Permit Modifications/Changes and TVEE Discussion Complete table at the bottom

The following changes were made to Enviva Pellets, LLC – Ahoskie Plant, Ahoskie, NC., Air Permit No. 10121T05*.

Page No.	Section	Description of Changes
Cover Letter	N/A	Updated cover letter with application number, permit numbers, and dates.
NA	Attachment	Added the "Notice Regarding the Right to Contest a Division of Air Quality Permit Decision".
Attachment	Insignificant Activities	Combined and moved green wood hammermill (IES-CHP2) to Section 1 as a significant activity. The description remains as "green hammermill" and ID No. changes to ES-GHM1.
Attachment	Insignificant Activities	Moved green wood handling and storage (IES-GWHS) to Section 1 as a significant activity. The description remains as "green wood handling and storage" and ID No. changes to ES-GWHS.
Attachment	Insignificant Activities	Moved Dry Wood Handling (ID No. IES-DWH) to Section 1 as a significant activity and renamed identification to (ID No. ES-DWH).
Attachment	Insignificant Activities	Removed pellet press system (IES-PP) since the source is already included in the pellet cooler exhaust.

Page No.	Section	Description of Changes
Attachment	Insignificant Activities	Added two natural gas-fired low NOx double duct burners (each rated at 2.5 million Btu per hour) with identifications (ID Nos. DDB1 and IES-DDB2).
Attachment	Insignificant Activities	Added the additive handling and storage with identification (ID No. IES-ADD).
Attachment	Insignificant Activities	Added the dry shavings handling and storage systems with identification (ID No. IES-DRYSHAVE) with a maximum throughput of 100,000 ODT per year.
Attachment	Insignificant Activities	Removed electric powered green wood chipper (IES-CHP-1) since the chipping is done offsite.
Attachment	Insignificant Activities	Renamed identification to the two existing Diesel storage tanks from IST1 and IST2 to IES-TK1 and IES-TK2.
Attachment	Insignificant Activities	Added Diesel storage tank (ID No. IES-TK3) with a capacity of 600 gallons and Diesel storage tank (ID No. IES-TK4) with a capacity of 1,000 gallons.
Attachment	Insignificant Activities	Added a compressed natural gas terminal with identification (ID No. IES-CNGT).
Attachment	Insignificant Activities	Added maximum through put for the electric powered bark hog (IES-BARK) at 91,406 ODT per year.
Attachment	Insignificant Activities	Replaced the diesel-fired fire water pump rated at 229 horsepower instead of 300 horsepower.
Attachment	Insignificant Activities	Added two natural gas-fired boilers each rated at 9.9 million Btu per hour. ID Nos. IES-BOIL1 and IES-BOIL2.
Attachment	Table of Contents	Updated the Table of Contents and moved the List of Acronyms from the end of the permit to this area of the permit.
New	New	Added three green hammermills with ID Nos. ES-GHM2 through ES-GHM4. All the green hammermills are controlled by the existing precipitator (CD-WESP) in series with the new oxidizer (CD-RTO).
New	New	Added one natural gas-fired regenerative thermal oxidizer rated at 40 million Btu per hour. The ID No. is CD-RTO.
4, 5	Section 1, Section 2.1 A.	Deleted the dryer cyclone as a control device (CD-DC) since it is integral in transporting product. After CD-WESP, the exhaust from the existing dryer (ES-DRYER) will be controlled by the new oxidizer (CD-RTO).
New	New	Added the existing furnace bypass stack with diesel startup. The ID No. is ES-FURNACEBYP
4, 5	Section 1, Section 2.1 A.	Added two dry wood hammermills with ID Nos. of ES-DHM6 and ES-DHM7. Added existing dust control system with an ID No. of ES-DCS. Deleted the dry wood hammermills simple cyclones (CD-DHM-C1 through CD-DHM-C4) as control devices since they are integral in transporting product.
4, 5	Section 1, Section 2.1. A	All of the dry hammermills and the dust control system exhausts to the existing fabric filters then to either the dryer or the precipitator. All exhaust from the referenced sources are always controlled by the fabric filters in series with the precipitator in series with new oxidizer (CD-RTO). Added footnote 1 at the bottom of Section 1.

Page No.	Section	Description of Changes
New	New	Added the dry shavings hammermill with integral cyclone and an ID No. of ES-DSHM. The exhaust from ES-DSHM is controlled by existing bin vent filter CD-DWDS-BV in series with the new oxidizer CD-RCO.
New	New	Added one natural gas-fired regenerative catalytic oxidizer (20 million Btu per hour heat input) that can operate as a regenerative thermal oxidizer. The ID No. is CD-RCO.
4, 5	Section 1, Section 2.1 A.	The exhaust from the existing dry wood day silo (ES-DWDS) is controlled by the existing bin vent filter (CD-DWDS-BV) in series with the new oxidizer (CD-RCO).
4, 5	Section 1, Section 2.1 A.	Added one new pellet cooler with an ID No. of ES-CLR6 and one new simple cyclone with an ID No. of CD-CLR-C4. All of the pellet coolers' exhaust are controlled by the cyclones in series with new oxidizer (CD-RCO).
New	New	To the table, added PSD and HAP avoidance conditions and regulations for 02D .0614, 02D.1100, and 02D .1806.
5	Section 2.1 A	For the appropriate sources and control devices, added emission limitations, monitoring, recordkeeping, and reporting for 02D .0515, 02D .0516, and 02D .0521.
5	Section 2.1 A	Moved the dry hammermills and associated control devices to new Section 2.1 B. For the appropriate sources and control devices, added emission limitations, monitoring, recordkeeping, and reporting for 02D .0515, 02D .0516, and 02D .0521.
5	Section 2.1 A	Moved the dried wood day silo, pellet mill feed silo, pellet coolers, fines bin, finished product handling, truck loadout and pellet loadouts and associated control devices to new Section 2.1 C. For the appropriate sources and control devices, added emission limitations, monitoring, recordkeeping, and reporting for 02D .0515, 02D .0516, and 02D .0521.
New	New	Added the Facility-wide Emissions Sources Table.
9	Sections 2.2 A.1.	Moved Section 2.2 A.1 to Section 2.2 A.11 (Fugitive Dust Emission Sources).
9	Sections 2.2 A.2.	Moved Section 2.2 A.2 to Section 2.2 A.7 (Toxic Air Pollutant Emission limitation and Requirements). Updated 15A NCAC 02D .1100 requirements to the current shell.
10	Sections 2.2 A.3.	Moved Section 2.2 A.3 to Section 2.2 A.9 (Emission Rates Requiring a Permit). Updated 15A NCAC 02Q .0711 requirements to the current shell.
11	Sections 2.2 A.4.	Moved Section 2.2 A.4 to Section 2.2 A.1. Added existing throughput limits to the wood-fired dryer, the dry hammermills, and the pellet cooler systems (Existing PSD Avoidance Conditions).
New	New	Added PSD Avoidance Conditions for PM, PM10, PM2.5, NOx, VOC, and CO with throughput limits, emission testing, monitoring, recordkeeping, and reporting requirements after construction is completed.

Page No.	Section	Description of Changes
New	New	Added Avoidance Conditions for HAPS that includes, emission testing, monitoring, recordkeeping, and reporting requirements after construction is completed.
New	New	Added Compliance Assurance Monitoring for the appropriate sources including requirements before and after construction.
New	New	Added approved modeled Toxic Air Pollutant Emission limitation and Requirements for the appropriate sources after construction.
New	New	Added 15A NCAC 02D .1806 regulation.
New	New	Added "Construction Schedule".
13 - 21	Section 3	The General Conditions were updated to the latest version of DAQ shell.

*This list is not intended to be a detailed record of every change made to the permit but a summary of those changes.

The changes mentioned above will be made to the Title V Equipment Editor (TVEE) under this permit application.

IV. Title V Renewal/ Modification Description

The flow diagram is located in Attachment 1. The wood pellet manufacturing description is detailed in the application as follows:

A. Green Wood Handling and Storage (ID Nos. ES-GWHS), Bark Hog (IES-BARK), and Green Wood Fuel Storage Bin (IES-GWFB)

"Green" (i.e., fresh cut) pre-chipped wood and bark are delivered to the plant via trucks from commercial harvesting and chipping operations and removed from the trucks using four (4) truck tippers. Oversized green wood material is removed from the pre-chipped wood and is transferred to the bark fuel storage pile for use in the furnace as fuel. Pre-chipped wood for drying is transferred by front end loader to the green wood storage piles and/or mixed wood storage pile. From the storage piles, the pre-chipped wood is placed into either the fresh reclaim hopper or the mixed reclaim hopper for processing in the green hammermills.

Purchased bark is removed from trucks using a truck tipper and the bark is then transferred by front end loader to the bark fuel storage pile for use as furnace fuel. The bark and oversized green wood material are placed into the bark reclaimer hopper for transfer through the fuel screener where oversized material is separated and hogged in the bark hog (IES-BARK) prior to being utilized as fuel. Following the fuel screener and bark hog, the bark and wood chips are transferred to an enclosed green wood fuel storage bin (IES-GWFB) where the material is pushed into the furnace. All transfer points and storage piles associated with the wood yard are included in the green wood handling and storage source (ES-GWHS).

Pre-dried wood, also referred to as Dry Shavings, is received by truck, unloaded by a truck tipper, and then transferred to storage and processing by front end loader.

B. Green Hammermills (ES-GHM1 through ES-GHM4)

Prior to drying, chips from the green softwood and/or mixed wood storage piles are processed in the green hammermills to reduce material to the proper size. In this application, Enviva is requesting approval to construct and operate three (3) new green hammermills (for a total of four (4) units) at the Ahoskie plant. Also, pursuant to this application, Enviva is requesting to remove the existing green hammermill (IES-CHP2) from the Insignificant Activities List and include all

green hammermills as emissions sources (ES-GHM1 through ES-GHM4). Emissions from the green hammermills will be routed for control to the existing dryer WESP (CD-WESP) and the proposed dryer RTO (CD-RTO).

C. Dryer (ES-DRYER) and Double Duct Burners (IES-DDB1 and IES-DDB2)

The existing dryer (ES-DRYER) uses direct contact heat provided to the system via a 175.3 MMBtu/hr total heat input furnace that uses bark and oversized wood chips as fuel. Green wood is fed into the dryer where moisture content is reduced to the desired level and routed to a simple cyclone for material recovery. Exhaust from the cyclone is routed to the existing dryer WESP (CD-WESP) for particulate, metallic HAP, and hydrogen chloride removal. In order to reduce VOC and HAP emissions from the dryer and other sources, the Ahoskie plant is proposing to construct and operate an RTO (CD-RTO). The dryer RTO will receive the exhaust from the existing dryer WESP (CD-WESP) to control VOC and HAP emissions generated during drying operations. Pursuant to this application, the dryer RTO (CD-RTO) will also control emissions from the green hammermill and dry hammermill operations.

As exhaust gas exits the dryer and begins to cool, wood tar (i.e., pitch) can condense and coat the inner walls of the dryer ducts creating a risk of fire. To prevent build-up of pitch and thus reduce the risk of fire, the two dryer ducts (herein referred to as double ducts) will be heated. The duct from the cyclone outlet to the ID fan will be heated by one low-NOx burner with a maximum heat input rating of 2.5 MMBtu/hr. A second 2.5 MMBtu/hr low-NOx burner will be used to heat the duct used for exhaust gas recirculation to the WESP. The double duct burners (IES-DDB1 and IES-DDB2) will combust natural gas and will exhaust directly to atmosphere.

D. Furnace Bypass Stack (ES-FURNACEBYP)

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

- Cold Start-ups: The furnace bypass stacks are used when the furnace is started up from a cold shutdown until the refractory is sufficiently heated and can operate at a low level (approximately 15% of the maximum heat input rate). The bypass stack is then closed, and the furnace is slowly brought up to a normal operating rate. The furnace bypasses are limited to no more than 50 hours per year for cold start-ups (for temperature control). The furnace bypass shall not be utilized at the same time and shall be limited to a cold startup of 15% maximum heat input or 26.3 million Btu/hr. Diesel fuel as a startup accelerant shall be limited to 30 gallons per startup and 200 gallons per year. Emissions resulting from diesel combustion are insignificant. The maximum sulphur content of any diesel fuel received and burned shall not exceed 0.5 percent by weight.
- Planned Shutdown: In the event of a planned shutdown the furnace heat input is decreased, and all remaining fuel is moved through the system to prevent a fire during the shutdown period. The remaining fuel is combusted prior to opening the furnace bypass stack. The furnace bypass stack is not utilized until after the furnace achieves an idle state (15 MMBtu/hr or less). Until this time, emissions continue to be controlled by the WESP and RTO.
- Idle Mode: The purpose of operation in “idle mode” is to maintain the temperature of the fire brick lining in 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 furnace. Idle mode is defined as maximum heat input of 15 million Btu per hour and operation up to 500 hours per year and with emissions routed to the Furnace Bypass Stack.
- Malfunction: The furnace automatically aborts to the bypass stack in the event of a malfunction. Aborts may be triggered by failsafe interlocks associated with the furnace or dryer and emissions control systems or utility supply systems. Typically interlocks divert

flue gas to the bypass stacks in the event of loss of utilities (electricity, water, compressed air or fuel), when monitoring conditions exceed safe operating ranges (temperature, pressure, flowrate) or in the event of a spark detection within the wood drying system and flue gas treatment areas. As soon as the furnace aborts it automatically switches to "idle mode" (defined as operation at up to a maximum heat input rate of 15 MMBtu/hr), the fuel feed is stopped, and the heat input rate drops rapidly.

Conditions under which the dryer bypass stack will be used are as follows:

- Malfunction: The dryer system automatically aborts due to power failure, equipment failure, or furnace abort. For example, if the RTO goes offline because of an interlock failure, the dryer will immediately abort. Dryer abort may also occur if the dryer temperature is out of range, or if a spark is detected.

Malfunctions are infrequent, unpredictable, and minimized to the maximum extent possible. They cannot be permitted, as they are, by definition, unplanned events. These emissions cannot reasonably be quantified and are not included in facility-wide potential emissions.

E. Dried Wood Handling (ES-DWH), Dry Hammermills (ES-DHM1 through ES-DHM7), and Dust Control System (ES-DCS)

Dried wood from the dryer material recovery integral cyclone is conveyed to the dry hammermills via the dried wood handling system. The dried wood handling emission source (ES-DWH) consists of partially enclosed conveyor systems, conveyor transfer points along the post-dryer conveyance system, an enclosed screener, and dry hammermill surge bins. Emissions are fugitive in nature. Due to updated emissions estimates, this source will no longer be considered insignificant and therefore Enviva requests the ID be changed from IES-DWH to ES-DWH.

Dried wood will be routed to one of seven (7) dry hammermills (ES-DHM1 through ES-DHM7) for further size reduction prior to pelletization. The Ahoskie plant is currently permitted to operate five (5) dry hammermills; however, Enviva is requesting authorization to construct and operate two (2) additional dry hammermills with this application. Each existing and proposed dry hammermill includes an associated material recovery cyclone that is routed to one of three (3) baghouses (CD-DHM-FF1 through CD-DHM-FF3) for particulate matter (PM) control.

As previously discussed, Enviva is proposing to control VOC emissions from the dry hammermills using a new RTO (CD-RTO) that will be installed downstream of the existing dryer WESP. An air flow recirculation process will be implemented to route a portion of the exhaust from each dry hammermill cyclone back into the front end of the respective dry hammermill to reduce fresh intake air and thus decrease the volume of air that is routed to the downstream control devices. The dry hammermill exhaust will be routed to baghouses, followed by a quench duct and then to either the dryer furnace (ES-DRYER), the dryer WESP (CD-WESP), or a combination of the two, before entering the RTO (CD-RTO).

All air flow from the dry hammermills is controlled by bagfilters (ID Nos. CD-DHM-FF1 through CD-DHM-FF3), the WESP (ID No. CD-WESP), and the RTO (ID No. CD- RTO). Under normal operations, all air flow from the bagfilters on the dry hammermills is ducted to the dryer furnace prior to treatment by the WESP and the RTO. In the event of reduced furnace/dryer operation, a portion of the air flow from the bagfilters on the dry hammermill is ducted directly to the WESP for treatment by the WESP in series with the RTO. In the event of the shutdown of the furnace/dryer system, all air flow from the bagfilters on the dry hammermills is ducted directly to the WESP and RTO. The purpose of the quench duct is to protect the RTO by reducing the risk

of fire. Interlocks will be installed to cease operation of the dry hammermills if a minimum flow rate is not maintained in the quench duct or if the furnace/WESP/RTO system ceases normal operation.

The furnace is not a control device and has no impact on estimated potential to emit. The WESP will provide a reduction in PM and metallic HAP, and the RTO will provide a reduction in VOC and organic HAP/TAP emissions. The highest pollutant inlet loading to the control devices will occur when the furnace and dryer are operating at maximum capacity with all dry hammermill exhaust routed to the inlet of the furnace. The quench system is considered inherent process equipment that is required to safely operate the RTO (i.e., reduce fire risk) and is not a control device.

Milled wood from the dry hammermill material recovery integral cyclones is transferred to the enclosed dry hammermill system discharge collection drag chain conveyor, then to the pellet mill feed silo infeed drag chain conveyor, and then to the pellet mill feed silo infeed screw conveyor. The dust control system (ES-DCS) collects PM from the transfer of dried wood fiber to the dry hammermill pre-screener, the dry hammermill area, the material recovery cyclone located downstream of the dried wood day silo (ES-DWDS), and finished product handling. The collected material is routed to the existing dry hammermill baghouse, CD-DHM-FF3, which will be routed to the proposed quench duct and then to either the dryer furnace (ES-DRYER), the dryer WESP (CD-WESP), or a combination of the two, before entering the proposed RTO (CD-RTO).

F. Dry Shavings Handling and Storage (IES-DRYSHAVE), Dried Wood Day Silo (ES-DWDS), and Dry Shavings Hammermill (ES-DSHM)

In addition to green chips, purchased dry wood and shavings are also used to produce pellets. These pre-dried wood/shavings bypass the green hammermill and drying processes and thus minimizes on-site VOC and HAP emissions. Purchased dry wood/shavings are unloaded from trucks via a truck tipper. Purchased dry wood/shavings are transported via frontend loader to a covered storage pile from which they are fed to a dedicated dry shavings hammermill (ES-DSHM). Milled purchased dry wood/shavings exiting the dedicated dry shavings hammermill are conveyed to a rotary valve where the material enters the high pressure blow line (HPBL) for transfer to the dried wood day silo (ES-DWDS). Emissions from loading and unloading of the silo are controlled by the dried wood day silo bin vent filter (CD-DWDS-BV). From the dried wood day silo, the milled dry shavings are transferred to a material recovery integral cyclone and then to an enclosed screener prior to transfer to the pellet mill feed silo infeed drag chain conveyor, followed by the pellet mill feed silo infeed screw conveyor which transfers material to the pellet mill feed silo (ES-PMFS).

Pursuant to this application, Enviva is requesting to include the existing dry shavings handling and storage source (IES-DRYSHAVE) and the existing dry shavings hammermill (ES-DSHM) in the permit. Currently, exhaust from the dry shavings hammermill is routed to a material recovery cyclone. A portion of the cyclone exhaust is recirculated back to the front of the dry shavings hammermill (ES-DSHM) and the remainder of the exhaust gases are routed to the dried wood day silo (ES-DWDS) that is controlled by the dry wood day silo bin vent filter (CD-DWDS-BV). Pursuant to this application, Enviva is proposing to route the dry wood day silo bin vent filter (CD-DWDS-BV) exhaust stream to the proposed quench duct and RTO/RCO (CD-RCO) to reduce VOC and HAP emissions from the dry shavings hammermill (ES-DSHM).

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

H. Additive Handling and Storage (IES-ADD)
Additive may be used in pellet production to act as a lubricant for the dies and increase the durability of the final product. The additive is received in 2000 lb supersacks and emptied into a hopper. The additive is transferred from the hopper via enclosed screw conveyor and is added to milled wood from the pellet mill feed silo discharge screw conveyor prior to transfer to the pellet mills. Because of minimal particulate matter emissions, the additive Handling and Storage (IES-ADD) activities are an insignificant activity. The additive contains no hazardous chemicals or VOCs.

I. Pellet mills and Pellet Coolers (ES-CLR1 through ES-CLR6)
Milled wood is mechanically compacted through presses in the pellet mills. Pursuant to this application, exhaust from the pellet mills and pellet mill conveyors will be vented through the pellet cooler aspiration material recovery cyclones (CD-CLR-C1 through CD-CLR-C4) and pollutant controls as described below, and then to the atmosphere.

Formed pellets are currently discharged into one of five (5) pellet coolers (ES-CLR1 through ES-CLR5). With this application, Enviva is proposing to install two (2) additional pellet mills and one (1) pellet cooler (ES-CLR6) for a total of twelve (12) pellet mills and six (6) pellet coolers. Similar to the existing pellet coolers, one (1) simple cyclone (CD-CLR-C4) is being proposed to receive the air stream from the two (2) new pellet mills and one (1) new pellet cooler (ES-CLR6).

Following the material recovery cyclones (CD-CLR-C1 through CD-CLR-C4), the captured material is conveyed to a rotary feeder to the HPBL that routes the material to the pellet mill feed silo (ES-PMFS). All exhaust from the pellet mills and pellet coolers is proposed to be routed to a quench duct and RTO/RCO (CD-RCO) to reduce VOC and HAP emissions prior to venting to the atmosphere. The quench duct is considered inherent process equipment that is required for the oxidizer (CD-RCO) to operate safely (reduce the risk of fire). A safety interlock will be installed to cease operation of the pellet mills and coolers if a minimum flow rate is not maintained or the oxidizer is not ready for operation. The oxidizer will operate in catalytic mode with thermal mode as a back-up during catalyst cleaning.

J. Finished Product Handling (ES-FPH), Fines Bin (ES-FB), Pellet Loadout (ES-PL1 and ES-PL2) and Truck Loadout Bin (ES-TLB)
Following the pellet coolers, pellets are conveyed to finished product handling (ES-FPH) where the final product is conveyed across a pellet screener, onto a collection conveyor, and then to a bucket elevator where it is dropped through pipe chutes onto a belt that feeds the truck loadout bin (ES-TLB). From the bin, pellets are gravity fed onto two (2) transfer belts per loading station which transfer pellets to a shuttle belt that drops pellets into trucks through one of two (2) covered chutes (ES-PL1 and ES-PL2). Finished product handling (ES-FPH), truck loadout bin (ES-TLB), and pellet loadout (ES-PL1 and ES-PL2) emissions are vented into the finished product handling baghouse (CD-FPH-BF) as a fire prevention measure to prevent any build-up of dust on surfaces within the finished product handling building. Fines from the finished product handling baghouse (CD-FPH-BF) are directed through an air lock to the HPBL and pneumatically transferred to the fines bin (ES-FB) which is controlled by a separate baghouse (CD-FB-BV). Collected fines are reintroduced into the pellet production process.

K. Emergency Generator (IES-EG), Fire Water Pump Engine (IES-FWP), and Diesel Storage Tanks (IES-TK1 through IES-TK4)

The plant has a 350 bhp Diesel-fired emergency generator (IES-GN) for emergency operations and is proposing to replace the existing 300 bhp Diesel-fired fire water pump engine with a new 229 bhp Diesel-fired fire water pump engine (IES-FWP). Aside from maintenance and readiness testing, the generator and fire water pump engines are only utilized for emergency operations.

The plant also includes several Diesel storage tanks. With this application, Enviva proposes to rename two (2) existing tanks that are in the permit from IST1 and IST2 to IES-TK1 and IES-TK2 and add two (2) other existing Diesel storage tanks to the permit (IES-TK3 and IES-TK4). Diesel for the existing emergency generator (IES-EG) is stored in a tank of up to 2,500 gallons capacity (IES-TK1) and Diesel for the fire water pump engine is stored in a tank of up to 500 gallon capacity (IES-TK2). IES-TK3 (up to 600 gallon capacity) is used to fill mobile equipment in the wood yard and the fire pump Diesel engine tank (IES-TK2). IES-TK4 (up to 1,000 gallon capacity) is used to provide fuel for front-end loaders and other facility equipment.

L. Compressed Natural Gas (CNG) Terminal (IES-CNGT)

With this application, Enviva is proposing to add a compressed natural gas (CNG) terminal (IES-CNGT). CNG will serve as a backup fuel to the primary fuel, natural gas, which will be used for combustion by the burners in the dryer RTO (CD-RTO), the pellet cooler RTO/RCO (CD-RCO), and the two double duct burners (IES-DDB1 and IES-DDB2). Note that there are no quantifiable emissions from this source and it is classified as an insignificant activity in accordance with 15A NCAC 02Q .0503(8).

M. Natural Gas-fired Boilers (IES-BOIL1 and IES-BOIL2)

Enviva is proposing to install two (2) natural gas-fired boilers each with a maximum heat input capacity of 9.9 MMBtu/hr. The boilers will be used to provide low pressure steam to the pellet mills. Steam will be injected into the raw wood fibers prior to the pelletizing process and will act as a lubricant. The boilers will be considered insignificant activities based on potential emissions.

V. Potential Emissions

The following table is the estimated potential to emit (PTE) from the first time Title V application. Detailed facility-wide emissions for criteria pollutants are located in Appendix 1 of this review.

Enviva's Estimated PTE	VOC (tpy)	NO_x (tpy)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)	CO (tpy)	CO_2e (tpy)	Total HAPs (tpy)
Baseline Permit 10121T05	391.60	183.98	129.66	129.63	129.63	19.2	45.09	162,292	29.88
12/29/2021 Proposed Modification Addendum	125.43	146.04	55.95	53.63	45.49	19.42	173.65	238,661	23.5
Change in Estimated PTE	**-266.17**	**-37.94**	**-73.71**	**-76.00**	**-84.14**	**+0.22**	**+128.56**	**+76,369**	**-6.38**

A. Green Wood Handling and Storage (ES-GWHS)

Particulate emissions will occur during chip and bark receiving, conveying, and handling operations. Fugitive PM emissions from chip and bark transfer operations were calculated based on AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles*[1]. Detailed potential emission calculations are included in Appendix 1.

B. Green Wood Storage Piles and Bark Fuel Storage Piles (ES-GWHS)
Particulate emission factors used to quantify emissions from storage pile wind erosion for the green wood storage piles and bark fuel storage piles were calculated based on USEPA's *Control of Open Fugitive Dust Sources*[2]. The number of days with rainfall greater than 0.01 inch was obtained from AP-42 Section 13.2.2, *Unpaved Roads*[3], and the percentage of time that wind speed exceeds 12 miles per hour (mph) was determined based on meteorological data from Northampton, North Carolina. The mean silt content of 0.0094% is based on data for bark from NCASI Special Report 15-01 with appropriate contingency based on engineering judgement[4]. The exposed surface area of the pile was calculated based on worst-case pile dimensions.

VOC emissions from storage piles were quantified based on the exposed surface area of the pile and emission factors from the National Council for Air and Stream Improvement (NCASI)[4A]. NCASI emission factors range from 1.6 to 3.6 pounds (lb) VOC as carbon/acre-day; however, emissions were conservatively based on the maximum emission factor. Detailed potential emission calculations are included in Appendix 1.

C. Bark Hog (IES-Bark)
PM emissions occur as a result of bark processing. Potential PM emissions from the bark hog were quantified based on emission factors from EPA's *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants for Source Classification Code (SCC) 3-07-008-01 (Log Debarking)*[5]. All PM was assumed to be larger than 2.5 microns in diameter. PM emissions from the bark hog are minimal due to the high moisture content of green wood (~50%). VOC and methanol emissions were quantified based on emission factors for log chipping from AP-42 Section 10.6.3, *Medium Density Fiberboard*[6]. Detailed potential emission calculations for the bark hog are included in Appendix 1.

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

E. Dryer (ES-DRYER), Green Hammermills (ES-GHM1 through ES-GHM4), Dry Hammermills (ES-DWH1 through ES-DWH7), and the Dust Control System (ES-DCS)
Exhaust from the dryer will be routed to a WESP and RTO (CD-RTO) for control of PM, VOC, and HAP. The green hammermills will share the dryer's existing WESP and proposed RTO for control of PM, VOC, and HAP. For potential-to-emit emissions estimates, green hammermill emissions are accounted for under the dryer WESP and RTO (CD-RTO). Exhaust from the dry hammermills and dust control system (ES-DCS) will also be controlled by the dryer WESP and the proposed RTO (CD-RTO). Emissions from the dry hammermills and dust control system are therefore also accounted for under the dryer RTO (CD-RTO). Emissions of CO, NOx, VOC, and PM are based on emission factors developed from process knowledge and engineering judgment. Potential emissions of sulfur dioxide (SO2) from green wood combustion were calculated based on the heat input of the furnace and an emission factor for wood combustion from AP-42, Section 1.6, Wood Residue Combustion in Boilers. HAP and toxics air pollutant (TAP) emissions were calculated based on emission factors from AP-42 Section 1.6, Wood Residue Combustion in Boilers,[8] and factors based on process knowledge and engineering judgment.

Emissions of CO and NO_X generated during thermal oxidization of VOC in the dry hammermill exhaust stream by the RTO were calculated based on AP-42 Section 1.4, Natural Gas Combustion and the maximum high heating value of the anticipated VOC constituents[9].

Emissions from natural gas combustion by the RTO were calculated based on AP-42 Section 1.4, Natural Gas Combustion[9]. Detailed emission calculations are included in Appendix 1.

F. Furnace Bypass (Cold Start-up)
Potential emissions of CO, NOx, SO2, PM, VOC and HAP for furnace bypass conditions were calculated based on emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*[8]. Emissions were based on 15% of the maximum heat input capacity (26.3 million Btu per hour) of the furnace and 50 hours per year of operation. Diesel fuel may be used as an accelerant for cold start-ups; however, as the amount used per event is typically 15 – 30 gallons and the annual usage is typically 100 – 200 gallons, emissions resulting from the use of Diesel fuel are insignificant and are not included in the ES-FURNACEBYP emission estimates. Detailed potential emissions calculations are included in Appendix 1.

G. Furnace Bypass (Idle Mode)
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 15 MMBtu/hr. During this time, emissions will exhaust out of the furnace bypass stacks. Potential emissions of CO, NOX, SO2, PM, VOC, and HAP were calculated based on emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*[8]. Detailed potential emission calculations are included in Appendix 1.

H. Double Duct Burners (IES-DDB1 through IES-DDB2)
Emissions from natural gas combustion by the double duct burners (IES-DDB1 through IES-DDB2) were calculated based on AP-42 Section 1.4, Natural Gas Combustion, AP-42 Section 1.5, and NC DAQ's Natural Gas Combustion Spreadsheet. Detailed emission calculations are included in Appendix 1. Per 15A NCAC 02Q .0503, the double duct burners (IES-DDB1 through IES-DDB2) are considered insignificant activities because potential uncontrolled criteria pollutant and HAP emissions are less than 5 tpy and 1,000 lb/yr respectively.

I. Dried Wood Handling (ES-DWH)
As previously described in Section 4, Dried Wood Handling (ES-DWH) has a partially enclosed conveyor systems and conveyor transfer points located after the dryer. Particulate matter emissions from transfers associated with ES-DWH were calculated based on AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles*[1]. VOC and HAP emissions were calculated based on emission factors derived from process knowledge and engineering judgement. Detailed potential emission calculations are provided in Appendix 1.

J. Dry Shavings Handling (IES-DRYSHAVE)
Particulate emissions occur during unloading of dry shavings to the dry shavings truck tipper and dry shavings handling and storage activities (IES-DRYSHAVE). Potential emissions from dry shavings transfer activities associated with IES-DRYSHAVE were calculated based on AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*.[1] Per 15A NCAC 02Q .0503, the Dry Line Hopper is an insignificant activity due to uncontrolled emissions below 5 tpy. Detailed potential emission calculations are provided in Appendix 1.

K. Pellet Mill Feed Silo (ES-PMFS)
The Pellet Mill Feed Silo is equipped with a bin vent filter (CD-PMFS-BV) to control PM emissions associated with silo loading and unloading operations. PM emissions are calculated

based on an exit grain loading rate and the maximum exhaust flow rate of the baghouse. Potential emission calculations are provided in Appendix 1.

L. Additive Handling and Storage (IES-ADD)

An additive may be used in the pellet production process to increase the durability of the final product. Potential emissions from transfer activities associated with Additive Handling (IES-ADD) were calculated based on AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*[1]. Detailed potential emissions calculations are provided in Appendix 1. Per 15A NCAC 02Q .0503, Additive Handling and Storage (IES-ADD) is considered an insignificant activity because potential uncontrolled PM emissions are less than 5 tpy. Potential emission calculations are provided in Appendix 1.

M. Dry Shavings Hammermill (ES-DSHM), Dried Wood Day Silo (ES-DWDS), and Pellet Mills and Pellet Coolers (ES-CLR1 through ES-CLR6)

The dry shavings hammermill (ES-DSHM), which processes purchased dry shavings prior to conveyance and storage in the dried wood day silo (ES-DWDS), generates PM, HAP, and VOC emissions. The dry shavings are combined with dried milled wood and are processed in the pellet mills and pellet coolers (ES-CLR1 through ES-CLR6).

The pellet mills and pellet coolers (ES-CLR1 through ES-CLR6) generate PM, HAP, and VOC emissions during the forming and cooling of wood pellets. The two (2) existing multicyclones (CD-CLR-C1 and CD-CLR-C2) each control emissions from four (4) pellet mills and two (2) pellet coolers (ES-CLR1 through 4). An existing simple cyclone (CD-CLR-C3) controls emissions from an additional two (2) pellet mills and one (1) pellet cooler (ES-CLR5). With this application, Enviva is proposing to install a new simple cyclone (CD-CLR-C4) to control PM emissions from the two (2) new pellet mills and new pellet cooler (ES-CLR6).

The exhaust streams from the pellet mills and pellet coolers (ES-CLR1 through ES-CLR6), as well as exhaust from the dry shavings hammermill (ES-DSHM), via the dried wood day silo (ES-DWDS), will be routed to a quench duct and then to an oxidizer (CD-RCO) for VOC and HAP control. The quench duct is considered inherent process equipment that is required to be installed for the oxidizer (CD-RCO) to operate safely (reduce the risk of fire) and is not a control device. A safety interlock will be installed to cease operation of the pellet mills and coolers if a minimum quench flowrate is not maintained. PM, VOC, and HAP/TAP emissions from the pellet mills, pellet coolers, the dry shavings hammermill, and the dried wood day silo were quantified at the outlet of the oxidizer (CD-RCO) based on process knowledge and engineering judgment. Controlled VOC and HAP/TAP emissions were conservatively based on process information and an appropriate contingency based on engineering judgement. The oxidizer will primarily operate in catalytic mode with thermal mode as a back-up during catalyst cleaning; however, the destruction efficiency of the control device is comparable in either mode of operation. Detailed calculations are provided in Appendix 1.

N. Natural Gas Boilers (IES-BOIL1 and IES-BOIL2)

Potential emissions from natural gas combustion by the proposed boilers were quantified based on the maximum heat input capacity of the boilers (9.9 MMBtu/hr each) and emission factors from AP-42 Chapter 1.4, Natural Gas Combustion[9]. Annual emissions are based on continuous operation (8,760 hours per year). Detailed potential emissions calculations are provided in Appendix 1.

O. Fines Bin (ES-FB), Truck Loadout Bin (ES-TLB), Pellet Loadout (ES-PL1 and ES-PL2), and Finished Product Handling (ES-FPH)

Particulate emissions from transfers associated with finished product handling (ES-FPH), the truck loadout bin (ES-TLB), and the pellet loadout (ES-PL1 and ES-PL2) are controlled by the finished product handling baghouse (CD-FPH-BF). Fines from the finished product handling baghouse (CD-FPH-BF) are directed to the fines bin (ES-FB) which is controlled by a baghouse (CD-FB-BV). Potential PM emissions were calculated based on an exit grain loading rate and the exhaust flow rate for each baghouse. Detailed potential emissions calculations are provided in Appendix 1.

P. Emergency Generator (IES-EG) and Fire Water Pump Engine (IES-FWP)

Operation of the emergency generator and fire water pump generates emissions of criteria pollutants and HAP. Potential PM, NO_X + non-methane hydrocarbon (NMHC), and CO emissions from operation of the emergency generator and fire water pump were calculated based on applicable emission standards from 40 CFR 60 Subpart IIII and the maximum horsepower rating of the engine. NO_X emissions from the emergency generator were conservatively based on the emission standard for NMHC. Potential SO2 emissions were calculated based on the fuel sulfur restriction in 40 CFR 60 Subpart IIII, assuming that all of the sulfur present in the Diesel fuel is emitted as SO2[12]. Potential HAP emissions from each engine were quantified based on emission factors from AP-42 Section 3.3, *Stationary Internal Combustion Engines*[13]. Annual potential emissions were conservatively calculated based on 500 hours per year.

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

Q. Diesel Storage Tanks (IES-TK-1 through IES-TK-4)

The storage of Diesel in on-site storage tanks generates emissions of VOC. VOC emissions from the four (4) Diesel Storage Tanks were calculated using equations and methodologies from AP-42, Chapter 7 (November 2019) based on actual tank characteristics (e.g., orientation, dimensions, etc.) and potential annual throughput. VOC emissions from the storage tanks are below 5 tpy and thus, per 15A NCAC 02Q .0503 they are listed as insignificant sources in the permit. Refer to Appendix 1 for detailed potential emission calculations.

R. Haul Roads

Fugitive PM emissions occur as a result of trucks, front-end loaders, and employee vehicles traveling on paved and unpaved roads on the Ahoskie plant property. Emission factors for paved roads were calculated based on Equation 2 from AP-42 Section 13.2.1, *Paved Roads*[14] using silt loading data based on sampling at a wood pellet manufacturing plant and 120 days with rainfall greater than 0.01 inch based on Figure 13.2.1-2. Emission factors for unpaved roads were calculated based on Equation 1a from AP-42 Section 13.2.2, *Unpaved Roads*[15] using surface material silt contents based on data from NCASI and sampling at a wood pellet manufacturing plant and 120 days with rainfall greater than 0.01 inch based on Figure 13.2.1-2. Refer to Appendix 1 for detailed potential emissions calculations.

Reference footnotes:

1. USEPA AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles* (11/06).
2. USEPA *Control of Open Fugitive Dust Sources*, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.
3. USEPA AP-42 Section 13.2.2, *Unpaved Roads* (11/06).
4. NCASI. Special Report No. 15-01: Estimating the Potential for PM2.5 Emissions from Wood and Bark Handling. Revised April 2015.

4A. NCASI. Technical Bulletin No. 700. Preliminary Investigation of Releases of Volatile Organic Compounds from Wood Residual Storage Piles. October 1995.

5. USEPA. Office of Air Quality Planning and Standards. *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants.* EPA 450/4-90-003. March 1990.
6. USEPA. AP-42 Section 10.6.3, *Medium Density Fiberboard* (08/02).

7. AP-42 Section 10.6.4, *Hardboard and Fiberboard*
8. USEPA AP-42 Section 1.6, *Wood Residue Combustion in Boilers* (09/03).
9. USEPA AP-42 Section 1.4, *Natural Gas Combustion* (07/98).
10. NCDAQ Wood Waste Combustion Spreadsheet for a wood stoker boiler. Available online at: https://files.nc.gov/ncdeq/Air%20Quality/permits/files/WWC_rev_K_20170308.xlsx.
11. South Coast Air Quality Management District's (SCAQMD) Air Emissions Reporting (AER) Tool. Available online at: http://www3.aqmd.gov/webappl/help/newaer/index.html
12. Sulphur content in accordance with Year 2010 standards of 40 CFR 80.510(b) as required by NSPS Subpart IIII.
13. USEPA AP-42 Section 3.3, *Stationary Internal Combustion Engines* (10/96).
14. USEPA AP-42 Section 13.2.1, *Paved Roads* (01/11).
15. USEPA AP-42 Section 13.2.2, *Unpaved Roads* (01/11).

VI. Regulatory Review – Specific Emission Source Limitations and Conditions for Significant Sources

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

$E = 4.10 \times P^{0.67}$ for $P < 30$ tph
$E = 55 \times P^{0.11} - 40$ for $P \geq 30$ tph

where, E = allowable emission rate (lb/hr)
P = process weight rate (tph)

According to the application, the most significant source of PM emissions is the green wood handling and storage system at approximately 150 wet tons per hour. The allowable emission rate is calculated to be 55.4 lbs/hr. The maximum hourly emission rate is 0.16 lbs/hr. Therefore, compliance is expected.

B. 15A NCAC 02D .0516 "Sulfur Dioxide Emissions from Combustion Sources" – Under this regulation, sulfur dioxide emissions from combustion sources cannot exceed 2.3 lb/million Btu heat input. Wood is fired in the furnace and low sulfur Diesel is combusted in the three emergency engines. Diesel is the worst-case fuel. Firing Diesel fuel (0.5% sulfur by weight) will not cause this limit to be exceeded. The RTO and RCO/RTO utilize natural gas, which is inherently low in sulfur. Therefore, compliance is indicated.

C. 15A NCAC 02D .0521 "Control of Visible Emissions" – This regulation establishes a visible emission standard for sources based on the manufacture date. For sources manufactured after July 1, 1971, the standard is 20% opacity when averaged over a 6-minute period. For the new or replaced sources, the Permittee will be required to establish 'normal' visible emissions from these sources within the first 30-days following the commencement of operation. In order to demonstrate compliance, the Permittee will be required to observe actual visible emissions on a monthly basis for comparison to 'normal' for all applicable sources except the pellet coolers. The pellet coolers will be observed on a weekly basis. If emissions are observed outside of 'normal', the Permittee shall take corrective action. Recordkeeping and reporting are required. Because all emission sources are designed to be well controlled, compliance with this standard is expected.

VII. Regulatory Review – Multiple Emission Source Limitations and Conditions

A. 15A NCAC 02D .0524 "New Source Performance Standards (NSPS), Subpart IIII" – This regulation applies to owners or operators of compression ignition (CI) reciprocating internal combustion engines (RICE) manufactured after April 1, 2006 that are not fire pump engines, and

fire pump engines manufactured after July 1, 2006. The 350 horsepower emergency generator and the new 229 horsepower fire pump engine are subject to the requirements of this regulation.

B. 15A NCAC 02D .1111 "Generally Achievable Control Technology, Subpart ZZZZ" – 40 CFR Part 63 applies to RICE located at a major or area source of hazardous air pollutants (HAP). Pursuant to 40 CFR §63.6590(c) (amended January 30, 2013), a new stationary RICE located at a major source must meet the requirements of this part by meeting the requirements of 40 CFR Part 60 Subpart IIII for compression ignition engines. 40 CFR Part 63, Subpart ZZZZ compliance is ensured by meeting the requirements of 40 CFR Part 60, Subpart IIII. No further requirements apply to such engines under this part.

C. "Compliance Assurance Monitoring" (CAM)
40 CFR Part 64 is applicable to any pollutant-specific emission unit, if the following three conditions are met:

- the unit is subject to any (non-exempt: e.g. pre November 15, 1990, Section 111 or Section 112 standard) emission limitation or standard for the applicable regulated pollutant.
- the unit uses any control device to achieve compliance with any such emission limitation or standard.
- the unit's precontrol potential emission rate exceeds either 100 tpy (for criteria pollutants) or 10/25 tpy (for HAPs).

For emission units with post-controlled emissions below the major source thresholds, a CAM plan must be submitted with the first Title V permit renewal application. As this is the first Title V renewal application for the facility, pre-modification and post-modification CAM requirements are addressed below.

Pre-modification CAM Applicability

The existing dryer (ES-DRYER) is subject to a PM emission limit under 15A NCAC 02D .0515. The dryer precontrolled emissions of PM10 exceed 100 tons per year. The dryer utilizes a wet electrostatic precipitator in order to comply with this standard; therefore, the existing dryer is subject to CAM.

The existing dry hammermills (ES-DHM1 through ES-DHM5) are subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from each dry hammermill are less than the major source threshold. As such the existing dry hammermills are not subject to CAM.

The existing green hammermill (IES-CHP2 renamed ES-GHM1) is subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from the green hammermill are less than the major source threshold. As such the existing green hammermill is not subject to CAM.

The existing dry shavings hammermill (ES-DSHM) is subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from the dry shavings hammermill are less than the major source threshold. As such the existing dry shavings hammermill is not subject to CAM.

The existing dried wood day silo (ES-DWDS) is subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from the dried wood day silo are less than the major source threshold. As such the existing dried wood day silo is not subject to CAM.

The existing pellet mill feed silo (ES-PMFS) is subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from the pellet mill feed silo are less than the major source threshold. As such the existing pellet mill feed silo is not subject to CAM.

The existing pellet mills and pellet coolers (ES-CLR1 through ES-CLR5) are subject to a PM emission limit under 15A NCAC 02D .0515 and utilize multicyclones and a simple cyclone to meet this limit. Pre-controlled emissions from the existing pellet mills and pellet coolers exceed the major source threshold; therefore, the existing pellet mills and pellet coolers are subject to CAM for PM.

The Finished Product Handling baghouse (CD-FPH-BF) controls PM emissions from Finished Product Handling (ES-FPH), the Truck Loadout Bin (ES-TLB), and the two (2) Pellet Loadouts (ES-PL1 and ES-PL2). The baghouse is required to achieve compliance with the applicable PM emission limits under 15A NCAC 02D .0515 and pre-controlled emissions from each of these sources exceed the major source threshold. As such, each of these sources is subject to CAM for PM.

PM emissions from the Fines Bin are controlled by a baghouse (CD-FB-BV) which is required to achieve compliance with the applicable PM emission limit under 15A NCAC 02D .0515. Since pre-controlled emissions from the Fines Bin exceed the major source threshold, this source is also subject to CAM for PM.

All other emission units at the Ahoskie plant have pre-controlled emissions below the major source threshold and/or do not use a control device as defined in 40 CFR 64.1 to achieve compliance with an emission limit. Thus, CAM does not apply to any other emission sources.

Prior to the proposed modifications, the Ahoskie plant will remain subject to a current facility-wide VOC emission limit in order to avoid the applicability of 15A NCAC 02D .0530. CAM applies to individual emission units subject to an applicable emission standard. CAM exempts sources subject to facility-wide emission caps. For this purpose, the PSD avoidance limits are a emission cap, not applicable.

For this permit, key elements of the pre-modification monitoring approach with the following control devices for particulate matter, including parameters to be monitored, parameter ranges, and performance criteria are presented in the following tables.

i. Fines bin vent filter **(ID No. CD-FB-BV),**
ii. Pellet cooler multicyclones **(ID Nos. CD-CLR-C1 and CD-CLR-2)**,
iii. Pellet cooler simple cyclone **(ID No. CD-CLR-C3)**,
iv. Finished product handling bagfilter **(ID No. CD-FPH-BF)**
v. Wet electrostatic precipitator **(ID No. CD-WESP)**.

Measure	Indicator
I. Indicator	Visible emissions
Measuring approach	Visible emissions (VE) from each control device **(ID Nos. CD-FB-BV, CD-CLR-1, CD-CLR-2, CD-CLR-3, and CD-FPH-BF)** will be observed daily using EPA Reference Method 22-like procedures.

Measure	Indicator
II. Indicator Range	An excursion is defined as the presence of visible emissions. Excursion triggers a demonstration of compliance with the 20 percent opacity standard in accordance with 15A NCAC 02D .2610 (Method 9) for 12 minutes; an inspection, corrective action, and a reporting requirement.
Quality Improvement Plan (QIP) threshold	The QIP threshold is five excursions occurring in a six-month reporting period
III. Performance Criteria	
Data Representativeness	Visible emissions shall be observed at the emissions point (control device exhaust).
Verification of Operational Status	N/A
QA/QC Practices and Criteria	The observer shall be familiar with EPA Reference Method 22 and follow Method 22-like procedures when VE is observed. Method 9 observations are conducted by a certified Reference Method 9 observer.
Monitoring frequency	A VE observation shall be performed daily, when operating.
Data Collection Procedures	The VE observation is recorded by the observer.
Averaging Period	N/A

Measure	Indicators for wood-fired direct heat drying system
I. Indicator	Secondary voltage and current for each grid
Measuring approach	Voltage and current indicator on each grid from control device **(ID Nos. CD-WESP)** will be recorded daily.

Measure	Indicators for wood-fired direct heat drying system
II. Indicator Range	An excursion occurs when the voltage and current measurement is less than the minimum indicator range or greater than the maximum indicator range. The excursion triggers corrective action and reporting requirement. Current indicator range for each grid: minimum 200m amps and maximum TBD amps. Voltage indicator range for each grid: minimum 20k volts and maximum TBD volts
Quality Improvement Plan (QIP) threshold	The QIP threshold is five excursions occurring in a six-month reporting period
III. Performance Criteria	
Data Representativeness	Current and voltage meters installed for each grid.
Verification of Operational Status	N/A
QA/QC Practices and Criteria	The current and voltage meters shall be maintained per manufacturers recommendations.
Monitoring frequency	A current and voltage observation for each grid shall be performed daily, when operating.
Data Collection Procedures	The current and voltage observation for each grid is recorded by the observer.
Averaging Period	N/A

Within 30 days of issuance of this permit, 10121T06, the Permittee shall determine the upper CAM ranges for current and voltage as indicated with "TBD" in the table above and submit an administrative amendment for those parameters to be incorporated into the permit. The ranges shall be determined under normal operating loads and represent an amount that is less than the upper compliance range. The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0614 if these ranges are not established or if a permit modification is not submitted.

The facility shall submit a summary report of all monitoring activities in the tables above. All instances of deviations from the requirements of this permit must be clearly identified. The reports shall comply with the reporting requirements of 40 CFR 64.9(a) and include, at a minimum, the following information, as applicable:

i. Summary information on the number, duration and cause (including unknown cause, if applicable) of excursions or exceedances, as applicable, and the corrective actions taken;
ii. Summary information on the number, duration and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other daily calibration checks, if applicable); and

iii A description of the actions taken to implement a QIP during the reporting period as specified in 40 CFR 64.8. Upon completion of a QIP, the Permittee shall include, in the next summary report, documentation that the implementation of the plan has been completed and reduced the likelihood of similar levels of excursions or exceedances.

It should be noted that the requirements for CAM applicability for any source involved in the modification may change as noted below for its operation post-modification. All others will remain the same (if applicable).

Post-modification CAM Applicability

The existing dryer (ES-DRYER) will remain subject to a PM emission limit under 15A NCAC 02D .0515. The dryer utilizes a wet electrostatic precipitator. The dryer precontrol potential PM emissions exceed 100 tons per year therefore, the existing dryer is subject to CAM for PM.

The existing and proposed dry hammermills (ES-DHM-1 through ES-DHM-8) will be subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from each dry hammermill will be less than the major source threshold. As such the existing and proposed dry hammermills will not be subject to CAM.

The existing and proposed green hammermills (ES-GHM-1 through ES-GHM-4) will be subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from each green hammermill will be less than the major source threshold. As such the existing and proposed green hammermills will not be subject to CAM.

The existing dry shavings hammermill (ES-DSHM) will remain subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from the dry shavings hammermill will remain below the major source threshold. As such the existing dry shavings hammermill will not be subject to CAM.

The existing dried wood day silo (ES-DWDS) will remain subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from the dried wood day silo will remain below the major source threshold. As such the existing dried wood day silo is not subject to CAM.

The existing pellet mill feed silo (ES-PMFS) will remain subject to a PM emission limit under 15A NCAC 02D .0515; however, pre-controlled emissions from the pellet mill feed silo will remain below the major source threshold. As such the existing pellet mill feed silo is not subject to CAM.

The existing pellet mills and pellet coolers (ES-CLR1 through ES-CLR6) will be subject to a PM emission limit under 15A NCAC 02D .0515 and utilize multicyclones and a simple cyclone to meet this limit. Pre-controlled emissions from the existing and proposed pellet mills and pellet coolers will exceed the major source threshold; therefore, the pellet mills and pellet coolers will be subject to CAM for PM.

An RTO/RCO (CD-RCO) will be installed to control VOC emissions from the pellet mills and pellet coolers; however, the RTO/RCO will not be installed to meet a specific emission limit but rather to reduce the plant's potential VOC and HAP emissions. The quench duct that is proposed to be installed upstream of the RTO/RCO is considered inherent process equipment and is being installed for safety purposes to reduce the risk of fire in the RTO/RCO. As such, it is not considered a control device.

The Finished Product Handling baghouse (CD-FPH-BF) will still be required to achieve compliance with the applicable PM emission limits under 15A NCAC 02D .0515 for the Finished Product Handling (ES-FPH), the Truck Loadout Bin (ES-TLB), and the two (2) Pellet Loadouts (ES-PL1 and ES-PL2). Pre-controlled emissions from each of these sources will exceed the major source threshold. As such, each of these sources will remain subject to CAM for PM. PM emissions from the Fines Bin will still be controlled by a baghouse (CD-FB-BV) which is required to achieve compliance with the applicable PM emission limit under 15A NCAC 02D .0515. Since pre-controlled emissions from the Fines Bin will exceed the major source threshold, this source will also remain subject to CAM for PM.

All other emission units at the Ahoskie plant have pre-controlled emissions below the major source threshold and/or do not use a control device as defined in 40 CFR 64.1 to achieve compliance with an emission limit. Thus, CAM does not apply to any other emission sources.

For this permit, key elements of the post-modification monitoring approach with the following control devices for particulate matter, including parameters to be monitored, parameter ranges and performance criteria are presented in the following table.

i. Fines bin vent filter **(ID No. CD-FB-BV),**
ii. Pellet cooler multicyclones and simple cyclones **(ID Nos. CD-CLR-C1 through CD-CLR-4)** in series with a regenerative catalytic oxidizer **(ID No. CD-RCO)**,
iii Finished product handling bagfilter **(ID No. CD-FPH-BF),**
iv. Wet electrostatic precipitator **(ID No. CD-WESP)** in series with a regenerative thermal oxidizer **(ID No. CD-RTO)**.

Measure	Indicator
I. Indicator	Visible emissions
Measuring approach	Visible emissions (VE) from the outlet of each control device **(ID Nos. CD-FB-BV, CD-RCO, CD-FPH-BF, CD-RTO)** will be observed daily using EPA Reference Method 22-like procedures.
II. Indicator Range	An excursion is defined as the presence of visible emissions. Excursion triggers a demonstration of compliance with the 20 percent opacity standard in accordance with 15A NCAC 02D .2610 (Method 9) for 12 minutes; an inspection, corrective action, and a reporting requirement.
Quality Improvement Plan (QIP) threshold	The QIP threshold is five excursions occurring in a six-month reporting period

Measure	Indicator
III. Performance Criteria	
Data Representativeness	Visible emissions shall be observed at the emissions point (control device exhaust).
Verification of Operational Status	N/A
QA/QC Practices and Criteria	The observer shall be familiar with EPA Reference Method 22 and follow Method 22-like procedures when VE is observed. Method 9 observations are conducted by a certified Reference Method 9 observer.
Monitoring frequency	A VE observation shall be performed daily, when operating.
Collection Procedures	The VE observation is recorded by the observer.
Averaging Period	N/A

The facility shall submit a summary report of all monitoring activities in the tables above. All instances of deviations from the requirements of this permit must be clearly identified. The reports shall comply with the reporting requirements of 40 CFR 64.9(a) and include, at a minimum, the following information, as applicable:

i. Summary information on the number, duration and cause (including unknown cause, if applicable) of excursions or exceedances, as applicable, and the corrective actions taken;
ii. Summary information on the number, duration and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other daily calibration checks, if applicable); and
iii A description of the actions taken to implement a QIP during the reporting period as specified in 40 CFR 64.8. Upon completion of a QIP, the Permittee shall include, in the next summary report, documentation that the implementation of the plan has been completed and reduced the likelihood of similar levels of excursions or exceedances.

D. 15A NCAC 02Q .0317 - Avoidance Conditions for 15A NCAC 02D .1112 "112(g) Case-by-Case Maximum Achievable Control Technology" – Until all of Permit 10121T06 Specific Limitations and Conditions from Section 2.3 A., "Actions to be Taken by the Permittee", have been met, the facility will accept a permit condition to limit emissions of any single HAP to less than 10 tpy and to less than 25 tpy for any combination of HAPs for avoidance of becoming a Title III major facility. Most of the HAP emissions are from the dryer, hammermills, and pellet cooler systems. Note: These sources are potentially subject to the Case-by-Case MACT because the US EPA has not promulgated any federal MACTs for these types of sources or industry. The facility will ensure the avoidance limits are met by proper operation and maintenance of existing sources and control devices.

For the facility to comply with the avoidance condition, the Permittee shall:

i. not process more than 420,480 oven-dried tons (ODT) of wood per year with an average maximum of 30% softwood from the wood-fired dryer system (ID No. ES-DRYER); and

ii. not process more than 357,408 ODT of wood per year with an average maximum of 30% softwood from the dry wood hammermill system (ID No. ES-DHM1 through ES-DHM5); and
iii. not process more than 481,800 ODT of pellets per year with an average maximum of 45% softwood from the pellet cooler system (ID No. ES-CLR1 through ES-CLR5).

Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall establish site specific emission factors for HAPs by conducting an initial performance test on the green hammermill (ID Nos. ES-GHM1), the wood-fired direct heat drying systems (ID No. ES-DRYER), the dry hammermills (ID Nos. ES-DHM1 to ES-DHM5), the dust control system (ID No. ES-DCS), the dry shavings hammermill (ID Nos. ES-DSHM), the dry wood day silo (ID Nos ES-DWDS), and the pellet coolers (ID Nos. ES-CLR1 through ES-CLR5). The pollutants and emission sources to be tested during the initial performance test are listed in the following table:

Emission Source	Pollutants
Green hammermill	Acetaldehyde Acrolein Formaldehyde Hydrogen Chloride Methanol Phenol Propionaldehyde
Dryer system controlled via precipitator	
Dry wood hammermills and duct control system via fabric filters	
Dry shavings hammermill and dry wood day silo via bin vent filter	
Pellet coolers via cyclone/multicyclones	

Testing shall be completed within 180 days from issuance of permit No. 10121T06 unless an alternate date is approved in advance by DAQ. The facility shall submit a protocol to DAQ at least 60 days prior to initial compliance testing and shall submit a notification of initial compliance testing at least 15 days in advance of the testing. The equipment or processes being tested are operated at or near the maximum normal production rate and be conducted at the maximum normal operating softwood percentage. Monitoring, recordkeeping, and reporting will be required according to the MACT Avoidance Condition, including calculations done on a 12-month rolling average. Because the facility has accepted an avoidance condition to limit the emissions of HAPs, it will be considered a Title III minor facility and avoid the applicability to case-by-case MACT standards.

E. 15A NCAC 02Q .0317 - Avoidance Conditions for 15A NCAC 02D .1112 "112(g) Case-by-Case Maximum Achievable Control Technology" – After all of Permit 10121T06 Specific Limitations and Conditions from Section 2.3 A., "Actions to be Taken by the Permittee", have been met, the facility will accept a permit condition to limit emissions of any single HAP to less than 10 tpy and to less than 25 tpy for any combination of HAPs for continued avoidance of becoming a Title III major facility. Most of the HAP emissions are from the dryer, hammermills, and pellet cooler systems. Note: these sources are potentially subject to the Case-by-Case MACT because the US EPA has not promulgated any federal MACTs for these types of sources or industry. The facility will ensure the avoidance limits are met by proper operation and maintenance of existing and proposed control devices.

For the facility to comply with the avoidance condition, the Green Hammermills will exhaust to wet electrostatic precipitators (CD-WESP) and regenerative thermal oxidizer (CD-RTO). Dryer HAPs will be controlled by the existing wet electrostatic precipitator (CD-WESP), in series with regenerative thermal oxidizer (CD-RTO).

HAP emissions from the dry hammermills (ES-DHM1 through ES-DHM7) and dust control system (ES-DCS) will be routed through integral cyclones, controlled by three bagfilters (ID Nos. CD-DHM-FF1 through CD-DHM-FF3), in series with furnace/dryer system (ES-DRYER), in series with a wet electrostatic precipitator (ID No. CD-WESP), in series and controlled by a regenerative thermal oxidizer (ID No. CD-RTO). HAP emissions from the dry hammermills and the dust control system (ES-DCS) can also be routed through integral cyclones, controlled by three bagfilters (ID Nos. CD-DHM-FF1 through CD-DHM-FF3), controlled by a wet electrostatic precipitator (ID No. CD-WESP), in series with a regenerative thermal oxidizer (ID No. CD-RTO).

All air flow from the dry hammermills and the dust control system (ES-DCS) are controlled by bagfilters (ID Nos. CD-DHM-FF1 through CD-DHM-FF), the WESP (ID No. CD-WESP), and the RTO (ID No. CD- RTO). Under normal operations, all air flow from the bagfilters on the dry hammermills is ducted to the dryer furnace prior to treatment by the WESP and the RTO. In the event of reduced furnace/dryer operation, a portion of the air flow from the bagfilters on the dry hammermills and the dust control system (ES-DCS) are ducted directly to the WESP for treatment by the WESP in series with the RTO. In the event of the shutdown of the furnace/dryer system, all air flow from the bagfilters on the dry hammermills and the dust control system (ES-DCS) is ducted directly to the WESP and RTO.

HAP emissions from the Dry Shavings Hammermills (ES-DSHM) and the dry wood day silo (ES-DWDS) will be controlled by bin vent filter (ID No. CD-DWDS) in series with a regenerative catalytic oxidizer (ID No. CD-RCO). The Pellet Press System and the six (6) pellet coolers (ES-CLR1 thru ES-CLR6) will route HAP exhausts through cyclones (ID Nos. CD-CLRC1 through CD-CLR-C4), in series with a regenerative catalytic oxidizer (ID No. CD-RCO) that can also operate as a regenerative thermal oxidizer.

Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall establish emission factors for HAPs by conducting initial and periodic performance tests on the green hammermills (ID Nos. ES-GHM-1 through ES-GHM-4), the wood-fired direct heat drying system (ID No. ES-DRYER), the dry hammermills (ID Nos. ES-DHM-1 to ES-DHM-7), the dust control system (ES-DCS), the dry shavings hammermills (ID Nos. ES-DSHM), the dry wood day silo (ID Nos ES-DWDS), and the pellet coolers (ID Nos. ES-CLR-1 through ES-CLR-6).

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

Emission Source	Pollutants
Green hammermills, dryer system, dry wood hammermills, and dust control system, controlled via oxidizer CD-RTO	Acetaldehyde Acrolein Formaldehyde Hydrogen Chloride Methanol Phenol Propionaldehyde
Dry shavings hammermill, dry wood day silo, and pellet coolers controlled via cyclones and oxidizer CD-RCO	

After construction and operation of the proposed control devices is completed, monitoring, recordkeeping, and reporting will be required according to the MACT Avoidance Condition, including calculations done on a 12-month rolling average. Because the facility has accepted an avoidance condition to limit the emissions of HAPs, it will be continue to be considered a Title III minor facility and avoid the applicability to MACT standards following the modification.

F. 15A NCAC 02Q .0317 "Avoidance Conditions" for avoidance of 15A NCAC 02D .0530 "Prevention of Significant Deterioration" – The avoidance conditions in Permit 10121T06 Section 2.2 A.1 apply until all of Section 2.3 A., "Actions to be Taken by the Permittee", have been met. Until such time as this condition is no longer applicable, the facility remains classified as PSD major source. The facility has enforceable limits so that emissions sources shall discharge into the atmosphere less than 391.6 tons of volatile organic compounds (VOC) per consecutive 12-month period. To ensure that the limits established above are not exceeded, the facility's wood-fired dryer system will not process more than 420,480 oven-dried tons per year (ODT/year). To ensure that the limits established above are not exceeded, the facility's dry hammermill system will not process more than 357,408 ODT/year. To ensure that the limits established above are not exceeded, the facility's pellet cooler system will not process more than 481,800 ODT/year. Process limits include a maximum softwood content of 30% for the dryer system and 30 % for the dry hammermills and each are for a rolling 12-month period. Process limits include a maximum softwood content of 45% for the pellet cooler system and are for a rolling 12-month period. The conditions are included in the permit with the limits and restrictions necessary to ensure compliance.

G. 15A NCAC 02Q .0317 "Avoidance Conditions" for avoidance of 15A NCAC 02D .0530 "Prevention of Significant Deterioration" – The avoidance conditions in Permit 10121T06 Section 2.2 A.3 apply after all of Section 2.3 A., "Actions to be Taken by the Permittee", have been met. Following the applicability of this condition, the facility will be classified as PSD minor. The facility has enforceable limits so that emissions of particulate matter, particulate matter 10 micrometers, particulate matter 2.5 micrometers, volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) remain below the 250 tpy PSD major source thresholds. The facility will be limited to an annual process rate of 550,000 ODT/year from the dryer and annual product throughput to 630,000 ODT/year on a rolling 12-month average basis with a maximum 100% softwood content. The facility will use an RTO and an RCO/RTO to control VOC emissions. The conditions are included in the permit with the limits and restrictions necessary to ensure compliance.

Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the PSD avoidance limits by conducting initial and periodic performance tests on the Green Hammermills (ID Nos. ES-GHM1 through ES-GHM4), the wood-fired direct heat drying system (ID No. ES-DRYER), the dry hammermills (ID Nos. ES-DHM1 through ES-DHM7), the dust control system (ES-DCS), the dry shavings hammermill (ID Nos. ES-DSHM), the dry wood day silo (ID Nos ES-DWDS), and the pellet coolers (ID Nos. ES-CLR1 through ES-CLR6). The pollutants and emission sources to be tested during the initial and periodic performance tests are listed in the following table:

Emission Sources	Pollutants
Green hammermills, dryer system, dry wood hammermills, and dust control system, controlled via oxidizer CD-RTO	VOC
	PM/PM10/PM2.5
	NOx
	CO
Dry shavings hammermill, dry wood day silo, and pellet coolers controlled via cyclones and oxidizer CD-RCO	VOC
	PM/PM10/PM2.5

Initial testing shall be completed within 180 days of commencement of the new control devices operation, and the report shall be submitted to the DAQ within 30 days of the completion of initial testing unless an alternative date is approved by the DAQ.

In addition to the initial testing requirements, the Permittee shall be required to 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. Annual performance tests shall be completed no later than 13 months after the previous performance test.

The Permittee shall install, calibrate, operate, maintain, and inspect a continuous temperature monitoring and recording system, in accordance with manufacturer's recommendations and the most recent performance test, for the regenerative thermal oxidizer and the regenerative thermal/catalytic oxidizer (ID Nos. CD-RTO and CD-RCO). To ensure compliance and effective operation of the oxidizers, the Permittee shall maintain a 3-hour rolling average firebox temperature for each of the fireboxes comprising the RTO or RCO 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 monitoring shall be recorded continuously, and data shall be logged for five years.

For the oxidizers, the Permittee shall develop and maintain a malfunction plan for the temperature monitoring and recording system that describes, in detail, the operating procedures for periods of malfunctions so that corrective actions can immediately be investigated. The malfunction plan shall identify malfunctions, as described by the manufacturer, and ensure the operators are prepared to correct such malfunctions as soon as practical. The Permittee shall keep any necessary parts for routine repairs of the temperature monitoring and recording system readily available. The Permittee shall perform periodic inspection and maintenance for the oxidizers as recommended by the manufacturer.
At a minimum, the Permittee shall perform an annual internal inspection of the primary heat exchanger and associated inlet/outlet valves of the control device to ensure structural integrity. To ensure compliance and effective operation of the wet electrostatic precipitator (ID No. CD-WESP), the Permittee shall perform inspections and maintenance and maintain the minimum secondary voltage and minimum current of the wet electrostatic precipitator. To ensure compliance and effective operation of the bagfilters, bin vent filters, and cyclones, the Permittee shall perform inspections and maintenance.

The process rate and hardwood/softwood mix shall be recorded in a monthly log kept on site. The results of the calculations and the total amount of PM, PM_{10}, $PM_{2.5}$, VOC, NOx, and CO emissions shall be recorded monthly in a logbook (written or electronic format) and made available to an authorized representative upon request. Semi-annual reporting of monitoring activities is required.

Monthly NOx emissions, in tons, shall be calculated by the following equations and emission factors until site-specific NOx emission factors are established through stack testing and approved by DAQ:

$$E_{\text{NOx (total)}} = \sum E_{\text{NOx (CD-RTO)}} + \sum E_{\text{NOx(CD-RCO)}} + \sum E_{\text{NOx (furnace bypass)}} + NOx\ Constant$$

Where:

$E_{NOx(Total)}$ = total tons of NOx emissions per month from the facility

$E_{NOx(CD\text{-}RTO)}$ = total tons of NOx emissions from the outlet of the thermal regenerative oxidizer (ID No. CD-RTO) per month

$E_{NOx(CD\text{-}RCO)}$ = total tons of NOx emissions from the outlet of the catalytic regenerative oxidizer / regenerative thermal oxidizer (ID No. CD-RCO) per month

$E_{NOx(furnace\ bypass)}$ = total tons of NOx emissions from the furnace/dryer bypass (ID No. ES- FURNACEBYP) per month

NOx Constant = 0.52 = monthly PTE tons of NOx from insignificant activity sources (emergency generator, fire water pump, double duct burners, and boilers)

Example calculations for potential NOx emissions per month:

Potential annual throughput via CD-RTO: = 550,000 ODT/yr
Potential annual throughput via CD-RCO: = 620,000 ODT/yr

NOx emissions from CD-RTO
(132 tpy NOx/12 months per year)= 11.0 tons NOx/month

NOx emissions from CD-RCO
(6.58 tpy NOx/12 months per year) = 0.55 ton NOx/month

NOx emissions from Furnace Bypass
(0.97 tpy NOx/ 12 months per year) = 0.08 ton/month

Maximum NOx emissions from all other sources facility-wide: 0.52 tons/month of NOx

Total facility NOx emissions example: 11.0 + 0.55 + 0.08 + 0.52 = 12.17 tons NOx/month

Monthly VOC emissions, in tons, shall be calculated by the following equations and emission factors until site-specific VOC emission factors are established through stack testing and approved by DAQ:

$$E_{\text{VOC (total)}} = \sum E_{\text{VOC (CD-RTO)}} + \sum E_{\text{VOC (CD-RC)}} + \sum E_{\text{VOC (furnace bypass)}} + VOC\ Constant$$

Where:

$E_{VOC(Total)}$ = total tons of VOC emissions per month from the facility

$E_{VOC(CD\text{-}RTO)}$ = total tons of VOC emissions from the outlet of the thermal regenerative oxidizer (ID No. CD-RTO) per month

$E_{VOC(CD\text{-}RCO)}$ = total tons of VOC emissions from the outlet of the catalytic regenerative oxidizer / regenerative thermal oxidizer (ID No. CD-RCO) per month

$E_{VOC(furnace\ bypass)}$ = total tons of VOC emissions from the furnace/dryer bypass (ID No. ES- FURNACEBYP) per month

VOC Constant = 1.81 = monthly PTE tons of VOC from green wood handling, dry wood handling, and insignificant activity sources (emergency

generator, fire water pump, bark hog, double duct burners, boilers, and Diesel storage tanks)

Monthly CO emissions, in tons, shall be calculated by the following equations and emission factors site-specific approved CO emission factors are established through stack testing:

$$E_{\text{CO(total)}} = \sum E_{\text{CO(CD-RTO)}} + \sum E_{\text{CO(CD-RCO)}} + \sum E_{\text{CO(furnace bypass)}} + CO\ Constant$$

Where:

$E_{CO(Total)}$	=	total tons of CO emissions per month from the facility
$E_{CO(CD-RTO)}$	=	total tons of CO emissions from the outlet of the thermal regenerative oxidizer (ID No. CD-RTO) per month
$E_{CO(CD-RCO)}$	=	total tons of CO emissions from the outlet of the catalytic regenerative oxidizer / regenerative thermal oxidizer (ID No. CD-RCO) per month
$E_{CO(furnace\ bypass)}$	=	total tons of CO emissions from the furnace/dryer bypass (ID No. ES- FURNACEBYP) per month
CO Constant = 0.82	=	monthly PTE tons of CO from insignificant activity sources (emergency generator, fire water pump, double duct burners, and boilers)

PSD Increment Tracking:
Hertford County has triggered increment tracking under PSD for NOx, SO_2, PM-10, and PM-2.5. This modification will result in a decrease of 8.66 pounds per hour of NOx, an increase of 0.05 pounds per hour of SO_2, a decrease of 17.35 pounds per hour of PM-10, and a decrease of 19.21 pounds per hour of PM-2.5.

H. 15A NCAC 02D .0540 Particulate from Fugitive Dust Emission Sources (State-enforceable only)
This regulation requires a fugitive dust control plan to be prepared if ambient monitoring or air dispersion modeling show a violation, or the potential for a violation, of a PM NAAQS, or if NC DAQ observes excess fugitive dust emissions from the facility beyond the property boundary for six (6) minutes in any one hour using EPA Method 22.

The fugitive dust control plan shall:
(1) identify the sources of fugitive dust emissions within the facility;
(2) describe how fugitive dust will be controlled from each identified source;
(3) contain a schedule by which the plan will be implemented;
(4) describe how the plan will be implemented, including training of facility personnel; and
(5) propose any methods that will be used to verify compliance with the plan.

The Director shall approve the plan if he or she finds that:
(1) the plan contains all required elements in the paragraph above;
(2) the proposed schedule contained in the plan will reduce fugitive dust emissions;
(3) the methods used to control fugitive dust emissions prevent fugitive dust emissions from causing or contributing to a violation of the ambient air quality standards for particulates; and
(4) the proposed compliance verification methods verify compliance with the fugitive dust control plan.

If the Director finds that the plan fails to control excess fugitive dust emissions, he or she shall require the owner or operator of the facility to correct the deficiencies in the plan. Within 90 days after receiving written notification from the Director identifying the deficiency, the owner or operator of the facility shall submit a revision to his or her plan to correct the deficiencies.

Enviva formally submitted a request for approval of a revised plan (revision 11) on 6/21/2019. Michael Abraczinskas approved the revised plan by letter on 8/12/2019. The latest dust control plan consists of the following:

1. PURPOSE
   The purpose of this Fugitive Dust/Emission Control Plan is to prevent and control fugitive dust emissions into the atmosphere by a combination of preventive maintenance, housekeeping and/or work practices in accordance with Fugitive Dust/Emissions Rule 15A NCAC 2D .0540(d)(2).

2. HEALTH AND SAFETY
   The health and safety of each employee is of ultimate importance. All employees are always required to wear proper PPE. No deviation of this policy is permitted.

3. DEFINITIONS
   - 15A NCAC 02D .0540 PARTICULATES FROM FUGITIVE DUST EMISSION SOURCES
     (a) For the purpose of this Rule the following definitions apply:
     (1) "Excess fugitive dust emissions" means:
     (A) Fugitive dust is visible extending beyond the facility's property line, or
     (B) Upon inspection of settled dust on adjacent property, the Division finds that the dust came from the adjacent facility.
     (2) "Fugitive dust emissions" means particulate matter that does not pass through a process stack or vent and that is generated within plant property boundaries from activities such as unloading and loading areas, process areas, stockpiles, stock pile working, plant parking lots, and plant roads (including access roads and haul roads).
   - Person –any person, firm, association, organization, partnership, business trust, corporation, company, contractor, supplier, installer, operator, user or owner, any government agency or public district, or employee thereof.
   - Opacity –the degree to which emissions (excluding water vapor) reduce the transmission of light and obscure the view of an object in the background, expressed as a percentage.
   - Solid Bulk Material –any material which emits dust when stored or handled and is generally unpackaged. Examples include but are not limited to sand, gravel, rock, clay, dirt, wood fiber, wood waste, and ash.

4. APPLICABILITY
   This Standard Operating Procedure (SOP) shall apply to any person engaged in activities, while on Enviva Pellets Ahoskie, LLC property, such as:
   - operation of machines or equipment
   - any/all construction, grading and/or clearing of land
   - processing, handling, storing and/or transporting materials
   - agricultural operations (cutting of grass, piling of mulch)

5. SOURCES OF FUGITIVE DUST
   - Along with representatives of the North Carolina Department of Environmental and Quality (NCDEQ), Enviva has conducted a review of plant operations for probable

sources of fugitive dust emissions and specifically for those that might release dust beyond the plant's property boundaries. Potential sources are identified:
  - site roadways
  - parking areas
  - all wood storage piles, except for piles with high moisture content and large particles (high moisture content and large particle piles are identified on Water Truck Route Diagram)
  - dry hammermill abort dumps
  - dryer fire dump
  - fines bin discharge
  - other bin abort/discharge dumps
  - chip unloading and ground management (frontend loader activity)
  - vehicle and equipment activity for housekeeping
  - equipment de-plugging activity
  - conveyors
  - dryer emergency abort stack
- As plant operations, maintenance, and weather conditions can change, this list of sources may change over time. As appropriate, employees are encouraged to submit suggestions for investigation and potential inclusion in this plan at any time to the Plant Manager.

6. GENERAL RESPONSIBILITIES/REQUIREMENTS
   No person may knowingly cause, allow or permit fugitive dust emissions without first implementing good housekeeping and/or work practices that take reasonable precautions to prevent particulate matter (dust) from becoming airborne. Good housekeeping and/or work practices include, but are not limited to the following:
   - Apply water and/or approved dust suppressants to minimize fugitive dust emissions from any ground surfaces when the facility is operating with dry conditions or when fugitive dust is observed. Application of water and/or approved dust suppressants is not necessary when it is precipitating or when the grounds are still wet from precipitation.
     - Operation of water truck 7 am- 7pm Monday through Sunday depending on the weather.
   - Use berms with grass to contain and reduce fugitive emissions (these are identified on the site diagram). Continue to grow grass as not all areas of the berm are covered at this time. Continue to evaluate the potential of fugitive dust barriers on the west side of the property.
   - Maintain compliance of vehicle speeds of no more than 10 MPH while driving anywhere on site to minimize fugitive dust emissions.

7. SPECIFIC RESPONSIBILITIES/REQUIREMENTS
   - The control room operator will use an on-site weather station to detect wind speed and the WESP's steam plume to determine direction.
   - Fugitive dust observation will be performed hourly by looking at the property lines that surround the facility along with looking throughout the site for fugitive dust sources
     - 7am-7pm via water truck operator at both entrances and along the site roadway.
     - 7pm-7am Shift Leader may use second platform from the Pellet Building adjacent to Pellet Press MCC room for observation. If a dust cloud is observed, then the shift leader must perform the observation at the entrance of the second driveway (Gate 2).
   - The control room operator will record weather conditions twice per shift once in the morning and then in the afternoon (Ahoskie wind record sheet attached). The water truck operator will record in a watering truck log sheet (example attached) tick marks for each watering trip and additionally record when the area is wet from rain or water truck trip.

- The shift leader must include fugitive dust events on the 'two-hour report.' When a citizen fugitive dust complaint is received by site management the shift leader will be notified. The shift leader will investigate the situation to determine the cause of the fugitive dust emissions and take corrective action including system shutdown, if necessary, to correct or improve conditions.
- The shift leader will then inform the EHS Manager who will ensure root cause is determined and put in place preventive steps to reduce the likelihood of such events in the future. Preventative steps will be recorded and applied by Enviva staff.
- The above same procedure will be followed if NCDEQ alerts Enviva of a fugitive dust complaint. Enviva will notify NCDEQ-WaRO of all fugitive dust complaints received within 48 hours of receipt of complaint.
- Enviva will contact complainants for follow-up. Information pertaining to the complaint, subsequent observations, and corrective actions will be recorded and retained on-site for at least 5 years.
- Any Enviva personnel shall call for the water truck when fugitive dust emissions are observed via truck traffic and/or mobile equipment. If fugitive dust emissions are noticed employees will contact the shift leader to implement appropriate corrective action to reduce the dust emissions.
- Operations personnel will discuss fugitive dust that was observed, source, and solution per day through shift change meetings. Records of discussions will be included in the shift meeting logs.

8. BEST MANAGEMENT PRACTICE
    - Hammermill fire dump chute rubber flaps at discharge points must be maintained.
    - Hammermill overflow chute corrugated snorkels must be maintained.
    - Maintain Ezzell Road to be clear of wood storage or reject material creepage.
    - The dryer fire dump misting system must be operational when the screw is operating, and the misting system must be maintained.
    - The fines bin discharge screw misting system must be operational when the discharge screw is operating, and the misting system must be maintained.
    - Housekeeping will continue to clean the site where build-up is occurring.
    - Maintain belt sweeps for optimal performance.
    - The west and north sides of the property are used for high moisture chip storage that are >40% moisture content.
    - The dryer abort stack halo water spray system must be maintained and operated while the dryer is in abort.

9. RECORDS
    - To verify compliance with this SOP, the following records will be maintained:
        - Daily Water Truck Sheet for three areas: Main entrance, Gate 2, and internal plant road. Truck operators will record each pass performed in the areas. (Water Truck Sheet attached)
        - The control room operator will record wind speed and direction. (Ahoskie Wind Record Sheet attached)
        - The dust complaint log shall record time, date, complainant's name, source, duration of event, corrective actions, and follow-up record with the complainant.
        - The shift meeting log will include the source and corrective actions of any fugitive dust incidents discussed during the meeting.
        - Maintenance/repair records associated with fugitive dust incidents will be maintained.

- All records will be kept on site and made available to NC DEQ staff as requested (sheets attached).
- Dust management plan records will be kept for 5 years and made available for inspection by state official.

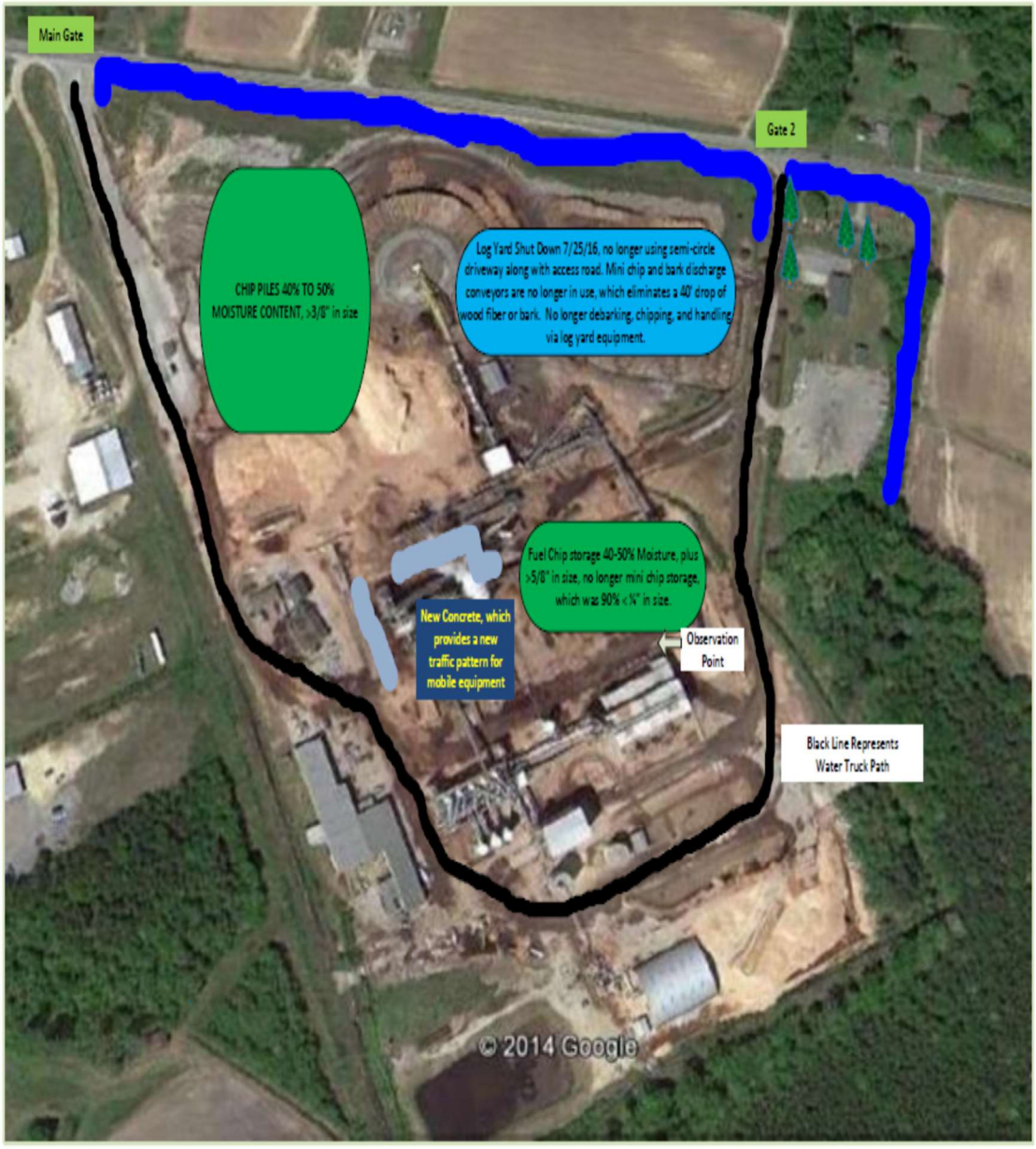
10. REPORTING
    - The Fugitive Dust/Emissions Control Plan shall be reviewed annually and evaluated for the need and feasibility of new or modified dust/fugitive emission control technology or practices. The results of this review and any proposed modification to the plan (if applicable) will be submitted to the NCDEQ-WaRO Air Quality Supervisor when changes are made.
    - Enviva will notify NCDEQ-WaRO of all fugitive dust complaints received within 48 hours of receipt of complaint.

11. SITE PICTURE-ATTACHED
    The watering truck route is indicated by a black line. This route includes the high traffic areas on site and is therefore considered to be the "typical" areas concerned with fugitive dust. Berms are indicated by blue lines.

12. ACTIONS TAKEN TO DATE:
    1. Dust management plan implementation
    2. Installation of weather station
    3. Installation of thick plastic strips on bark conveyor discharge
    4. Installed enclosure for mega-hopper
    5. Misting system on hammermill conveyor overflow chute
    6. Water truck purchased April 2012 and upgraded in April 2013 with additional employees to operate.
    7. Completed road work behind secondary chip storage with an added slag layer
    8. Installed metal chutes with plastic strip extensions on secondary storage distribution conveyor discharge points
    9. Created sheets for dust control recordkeeping, water truck and control room
    10. Created logbook for neighborhood dust complaints, which is kept in Corporate via Morgan Pitts
    11. Curtains installed on in-feed conveyor to secondary storage
    12. Planted Leyland Cypress trees
    13. Modified discharge chute for green screener to reduce drop distance
    14. Installed dryer discharge screw misting system
    15. Due to the wind speed and direction action limits per plan causing a loss of chip mill production, the facility added additional shift to operate 24 hours a day and 7 days a week.
    16. Revised plan with new plant manager, Tom Garrahan, identified as owner of the property in respects of this plan, which responsible of the contents, implementation, and follow up of said plan.
    17. Revised site map to reflect larger trees installed on north east property line beside Cale's residents.
    18. Monthly training for water truck and control room operator procedures
    19. Purchased second Water Truck due to the reliability of the first truck.
    20. Install fines capture system, $2.4 million, which includes vacuum points at truck loadout, various transition points throughout conveyance system, standalone baghouse, CAR65-8 baghouse which is installed on top of fines bin with a wetting discharge screw.
    21. Continuous 5s initiative to clean up site, to eliminate fiber piles that are not process fiber, spearheaded by Terry Green, Continuous Improvement Director

22. Belt sweeps to clean conveyor belts throughout the conveyance system
23. Temp employees to clean site on a routine basis
24. Purchased Mr. Cale's property, so Enviva can build a berm to catch fugitive wood/road dust
25. Building berm on Mr. Cale's property
26. Revised Dust Management Plan to establish Randy Smith, Production Manager, identified as owner of the property in respects of this plan, which responsible of the contents, implementation, and follow up of said plan.
27. Revised Dust Management Plan to establish Jason Ansley, Plant Manager, identified as owner of the property in respects of this plan, which responsible of the contents, implementation, and follow up of said plan.
28. Chip mill stopped processing chips on 7-15-16, which eliminated the need to discharge to storage piles and bark from high drop point.
29. No longer discharging from 40' into mini chip nor bark conveyor, 7/15/2016
30. Using primary sizing mix bunkers to store fuel chips at 40% to 50% moisture plus the fuel chips are larger than pelleting process chips. Fuel chips >5/8" vs. Pelleting Process chips 90% <1/4" in size, 7/25/2016.
31. Installed spray nozzles onto dryer dump chute, 12/29/16
32. Installed more concrete around tipper #1 and furnace to reduce dust
33. Installed heavy flaps on the fire dump DHM chute
34. Berm completed, waiting on vegetation growth. 11/15/2017
35. Added Curtis Hall, Plant Manager, as document owner
36. Installed halo spray system around the dryer abort stack. August 15, 2018

Site Map



Enviva complies with all aspects of the most recently DAQ-approved fugitive dust control plan. Recordkeeping and reporting are required.

I. <u>15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions (State-enforceable only)</u>

The Permittee shall not operate the facility without implementing management practices or installing and operating odor control equipment sufficient to prevent odorous emissions from the facility from causing or contributing to objectionable odors beyond the facility's boundary. This permit application does not affect this status.

J. 15A NCAC 02D .1100 Control of Toxic Air Pollutant (TAP) Emissions and 15A NCAC 02Q Toxic Air Pollutant Emission Rates Requiring a Permit – Pursuant to 15A NCAC 02Q .0711 (State-enforceable only)

15A NCAC 02D .1100 outlines the procedures that must be followed if a TAP permit and associated modeling are required under 15A NCAC 02Q .0700. Under 15A NCAC 02Q .0704(d), a TAP permit application is required to include an evaluation of the TAP emissions from a facility's sources, excluding exempt sources listed in Rule .0702 of this Section. DAQ Air Quality Analysis Branch (AQAB) reviewed Enviva's modeling and approved the analysis on February 16, 2015. The toxics emissions limitations and requirements located in permit Section 2.2 A.6. shall remain in effect until all of the requirements from permit Section 2.3 A. have been met.

Permit application 4600107.20B triggered modeling requirements to evaluate those toxics whose rates are expected to exceed the levels outlined in 15A NCAC 2Q .0700 and there are ten TAPs that were above the levels in 15A NCAC 2Q .0700. The ten TAPs that were evaluated in the facility-wide modeling are: acrolein, arsenic, benzene, cadmium, chlorine, formaldehyde, hexachlorodibenzo-p-dioxin, HCl, manganese, and phenol. On April 26, 2022, the modeling was approved by DAQ meteorologist Nancy Jones and Tom Anderson. With the wide margins of compliance with the percent of the AAL, the facility will continue to ensure compliance. Below is a summary of AQAB approved Enviva modeling results.

Maximum Impacts Enviva Pellets Ahoskie
Ahoskie, Hertford County, North Carolina

TAP	Averaging Period	Scenario*	Max. Conc. (µg/m^3)	AAL (µg/m^3)	% of AAL
Acrolein	1-hour	NORM	4.9	80	6
Arsenic	Annual	NORM	1.37E-5	2.1E-3	1
Benzene	Annual	NORM	0.012	0.12	10
Cadmium	Annual	NORM	2.55E-5	5.5E-3	<1
Chlorine	1-hour	NORM	0.42	900	<1
	24-hour	NORM	0.29	37.5	1
Formaldehyde	1-hour	NORM	1.005	150	9
HCl	1-hour	BYP_S	0.39	700	1
HXDD	Annual	NORM	6.85E-6	7.6E-5	<1
Manganese	24-hour	NORM	0.03	31	<1
Phenol	1-hr	NORM	0.773	950	<1

* Scenario with the highest modeled air concentration.

This compliance demonstration assumes the source parameters and pollutant emission rates used in the analysis are correct. The modeling adequately demonstrates compliance, on a source-by-source basis, for all toxics modeled. The toxics emissions limitations and requirements located in permit Section 2.2 A.7. and approved in the AAL Table above shall become effective after all of the requirements from permit Section 2.3 A. have been met.

VIII. Compliance Status

The most recent inspection was conducted on March 15-16, 2022 by Kurt Tidd of the Washington Regional Office. The conclusion of the inspection was: "The facility appeared to be operating in compliance with all applicable Federal and State rules, regulations, and permit conditions at the time of the inspection.".

According to the WaRO compliance database, a Notice of Deficiency was issued to the facility on July 12, 2017 for recordkeeping deficiencies with the watering truck and team leader dust observation logs from May 2016 through April 2017. There have been no other deficiencies or violations within the past five years.

IX. Facility Comments on Draft Permit and NCDAQ's Responses

Comments on Draft Permit received June 7, 2022
Significant comments from Enviva are addressed here. Minor typographical errors, incorrect references, etc. are not addressed below but are corrected in the permit.

- Enviva requests the removal of PSD avoidance conditions for PM, PM_{10} and $PM_{2.5}$ due to low potential emissions compared to the threshold.

  Response
  DAQ will retain the PSD avoidance conditions for PM, PM_{10} and $PM_{2.5}$. The estimated particulate emission factors used are not site specific until after all the control devices are installed from this modification. Once approved stack tested emission factors are confirmed, a later determination could be made.

- Enviva requests the removal 15A NCAC 02D .0614 particulate CAM (Compliance Assurance Monitoring) for the wet electrostatic precipitator and the regenerative thermal oxidizer control devices (CD-WESP and CD-RTO). Enviva explained:
  "The dryer is not subject to CAM because uncontrolled potential emissions are less than the process weight limit (i.e., the WESP is not required to meet the applicable emission standard). See below CAM applicability language:
  a) General applicability. Except for backup utility units that are exempt under paragraph (b)(2) of this section, the requirements of this part shall apply to a pollutant-specific emissions unit at a major source that is required to obtain a part 70 or 71 permit if the unit satisfies all of the following criteria:
  (1) The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or a surrogate thereof), other than an emission limitation or standard that is exempt under paragraph (b)(1) of this section;
  (2) The unit uses a control device to achieve compliance with any such emission limitation or standard; and
  (3) The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source. For purposes of this paragraph, "potential pre-control device emissions" shall have the same meaning as "potential to emit," as defined in §64.1, except that emission reductions achieved by the applicable control device shall not be taken into account."

  Response
  DAQ will retain the before and after modification CAM requirements for the wet electrostatic precipitator and the regenerative thermal oxidizer control devices. The wood furnace system's uncontrolled particulate emissions are above the 100 tpy threshold. DAQ compliance section email explanation is:
  "The CAM applicability is based on "potential pre-control emissions" greater than major source threshold. It is not compared to the "process weight limit or the throughput rate". Therefore, if potential pre-control emissions are greater than major source threshold and control device is used to demonstrate compliance with the applicable emission standard, then CAM applies regardless of the process weight limit/throughput rate. They have to demonstrate compliance without a control device, and the permit should specify that control device is not used for compliance

purposes." The facility can prove the device to control particulate is not needed once site specific stack testing has been approved to determine the before control device and the after control device emission factors.

- Enviva requests that the DAQ change the 15A NCAC 02D .0521 visible emissions observations from monthly to weekly and be consistent with Sampson and Hamlet facilities.

  Response
  Based on discussions from Washington Regional Supervisor, Betsy Huddleston, DAQ agrees and will change the visible emissions observations for all applicable sources to monthly except for the pellet coolers. The pellet cooler visible emission observation frequency will remain weekly since the sources have documented public complaints.

- Enviva requests the use of a 3-hour block average rather than a 3-hour rolling average for both oxidizer control devices, consistent with the requirements of the PCWP MACT and the EGGER Wood Products, LLC permit (Facility ID 2900386, Permit No. 10565R02).

  Response
  Based on previous meetings and discussions with the Compliance Section, DAQ will retain the 3-hour rolling average.

- Enviva requests to record the bypass hours on the furnace and dryer monthly instead of weekly.

  Response
  DAQ will retain the weekly recording for bypass hours which is consistent with other NC Enviva facilities.

- Enviva requests to remove recording diesel fuel usage during cold startups for the furnace.

  Response
  DAQ will retain the recording of diesel fuel usage during cold startups which is consistent with other NC Enviva facilities. Since the diesel usage is limited to 30 gallons per start-up and 200 gallons per year, recording is required.

- Enviva requests to have the 15A NCAC 02D .0540 fugitive requirements to be more generic by excluding dates.

  Response
  DAQ agrees and will remove old dates from the regulation. The fugitive dust plan has been updated several times in the past and could be updated in the future.

- Enviva requests to allow more time on the construction schedule requirements due to supply chain issues and labor shortages.

  Response
  DAQ agrees and will allow more construction time with this modification on control devices CD-RTO, CD-RCO, and CD-CLR-4.

X. Public Notice/EPA and Affected State(s) Review

A thirty-day public notice period and a forty-five-day EPA review period is required for both the TV renewal with a significant modification. A notice of the DRAFT Title V Permit shall be made

pursuant to 15A NCAC 02Q .0521. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q .0522, a copy of each permit application, each proposed permit and each final permit pursuant shall be provided to the EPA. Also pursuant to 02Q .0522, a notice of the DRAFT Title V Permit shall be provided to each affected State at or before the time notice is provided to the public under 02Q .0521 above.

EPA's 45 Day Review period
Brad Akers (U.S. EPA, Region IV) was provided a PROPOSED permit for review on September 28, 2022. On November 9, 2022, Estelle Bae from the EPA Region 4 responded by email: "Thank you for the opportunity to review Enviva - Ahoskie. The permits looks good. We don't have any comments from the reading through the permit or from the hearing officer's report." EPA 45-day review period ended on November 13, 2022.

Public Notice
The 30-day public notice of the PROPOSED permit was posted on the NCDAQ website on July 13, 2022. Comments were offered or received. See Hearing Officer's recommendations in Section XII below and the full report is posted on the DAQ website.

In addition to the required public notice and comment period, the Division Director has deemed this permit application (and facility) to have significant public interest. The DAQ held a face-to-face public hearing. The hearing took place at Roanoke-Chowan Community College gymnasium 109 Community College Road Ahoskie, NC 27910 on August 16, 2022. The notice for this hearing was placed in the Roanoke-Chowan News Herald on July 13, 2022.

XI. Other Regulatory Considerations

- An application fee for this amended Title V renewal and modification application was submitted on September 2, 2020 for $988.
- The appropriate number of application copies was received by the DAQ.
- A Professional Engineer's Seal is required for this application. Russell Kemp did seal this Title V application on December 20, 2021 with Professional Engineer Seal No. 19628.
- A zoning consistency determination is required for this application. On November 5, 2020, the Town of Ahoskie Planning and Zoning Administrator representative Tomekia Mitchell-Holloman approved the zoning consistency determination.
- According to the application, the facility does not store any materials in excess of the 112r applicability threshold.
- The application was signed by Mr. Bryan Grissett, Plant Manager, on December 20, 2021.
- Due to public interest in this project, the DAQ Director did require a public hearing.

XII. Recommendations

The public comment period for this draft permit ran from July 13, 2022 through August 29, 2022. A public hearing was held on August 16, 2022. Comments were received and a Hearing Officer's Report was created with the following recommendations.

- Include language requiring submittal of an updated fugitive dust plan to include all new sources of fugitive dust emissions and any new strategies to control fugitive dust emissions. The condition should also include a submittal deadline date.

  Based on the Hearing Officer's Report, the following permit language was added to Section 2.3 A.4: Within 90 days after of completing installation of new control

devices (ID Nos. CD-RTO and CD-RCO), the facility shall submit an updated fugitive dust control plan for demonstrating compliance with 15A NCAC 02D .0515.

- Add hydrogen chloride in all stack testing conditions concerning HAP emissions.
  Based on the Hearing Officer's Report, hydrogen chloride testing was added to permit Sections 2.2 A.2.d., 2.2 A4.c, and 2.2 A4.d.

- Include a condition to limit HAP emissions to avoid 15A NCAC 02D .1112, "112(g) Case-by-Case Maximum Achievable Control Technology" from the time period from the date of issuance of the permit (current state of operations) through the completion of the construction phase of the project. The condition should include a specific testing requirement with a completion and test submittal date of 180 days after the issuance of the permit.
  Based on the Hearing Officer's Report, a current state of operations HAP avoidance condition was created in permit Section 2.2 A.2 with a discussion added above in Section VII. D. The HAP avoidance condition was also included in permit tables Sections 2.1 A, 2.1 B, 2.1 C and 2.2 A.

- Include language to ensure the facility is responsible for collecting sufficient data during stack testing to justify any new parametric monitoring values.
  Based on the Hearing Officer's Report, the following permit language was added to Section 2.2 A.3.e.xv: The Permittee is responsible for collecting sufficient data during stack testing to justify any new parametric operating limits and for accurately calculating and documenting all parametric operating limits required to be established by the Permittee following each new stack test.

- Remove the cyclone (ID No. CD-CLR6) requirements to purchase the control device within 12 months, to install the control device within 24 months, and to complete construction of the control device within 48 months from the draft permit.
  Based on the Hearing Officer's Report, the pellet cooler cyclone construction schedule was removed from permit Sections 2.3 A.1, 2.3 A.2, and 2.3 A.3.

- The table for toxic air pollutants limits should be corrected in the draft permit.
  Based on the Hearing Officer's Report, minor corrections were made to Section 2.2 A.8.

- Update Specific Limitation and Condition No. 2.1 – B.1.a. to replace the reference to "ES-DSC" with "ES-DCS."
  Based on the Hearing Officer's Report, updated permit Section 2.1 B.1.a emission source ID No. to from ES-DSC to ES-DCS.

- Add "ES-PMFS" to Conditions 2.1 – A.1.a, C.3.a., and C.3.c. in the draft permit.
  Based on the Hearing Officer's Report, added emission source ID No. ES-PMFS to permit Sections 2.1 C.1.a, 2.1 C.2.a, and 2.1 C.3.a.

- Updated all source identification numbers so they match throughout the draft permit.
  Based on the Hearing Officer's Report, removed the "-" symbol out of all applicable ID Nos. throughout the permit.

- Remove the statement "in series with an oxidizer" from Specific Limitation and Condition No. 2.2 – A.4.d.iii. in the draft permit.

  Based on the Hearing Officer's Report, removed permit language "in series with an oxidizer" in Section 2.2 A.5.iii.

The permit application for Enviva Pellets, LLC – Ahoskie Plant, Hertford County, North Carolina has been reviewed by DAQ to determine compliance with all procedures and requirements. The DAQ has determined that this facility will achieve compliance, as specified in the permit, with all requirements that are applicable to the affected sources. The DAQ recommends the issuance of Air Permit No. 10121T06.

Attachment 1

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

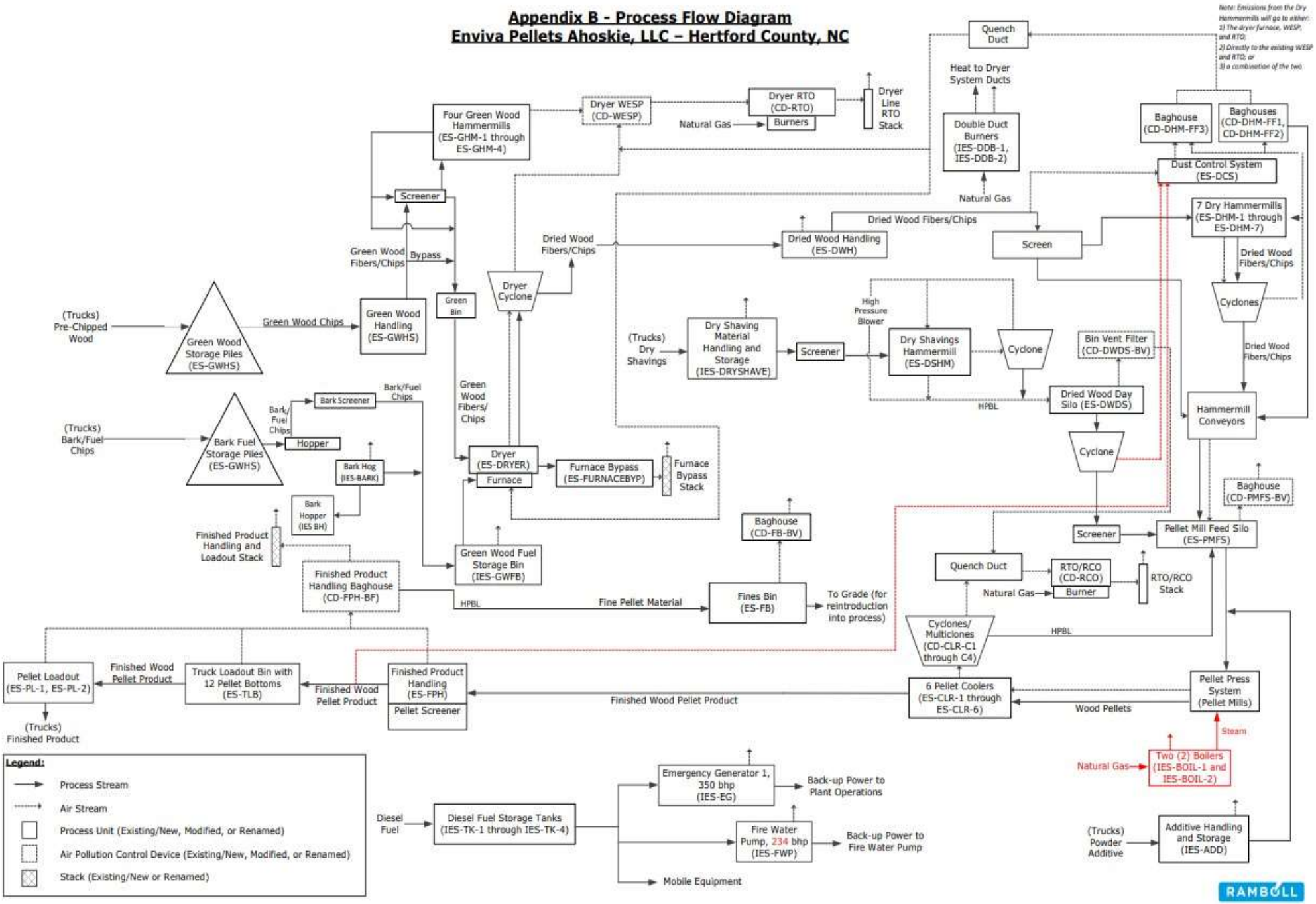


Table 1
Summary of Facility-wide Criteria Pollutant and CO2e Potential Emissions
Enviva Pellets Ahoskie, LLC

Emission Unit ID	Source Description	Control Device ID	Control Device Description	CO (tpy)	NOx (tpy)	TSP (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)	Total VOC (tpy)	CO_{2e} (tpy)
ES-DRYER	Dryer	CD-WESP; CD-RTO	WESP; RTO	139	132	30.2	30.2	30.2	19.2	72.3	214,500
ES-GHM-1 through -4	Green Wood Hammermills 1 through 4										
ES-DHM-1 through -7 ES-DCS	Dry Hammermills 1 through 7; Dust Control System	CD-DHM-FF1 through FF3; CD-WESP; CD-RTO	Baghouses; WESP; RTO								
ES-FURNACEBYP	Furnace Bypass Stack	--	--	2.64	0.97	2.54	2.28	1.97	0.11	0.075	924
IES-DDB-1 and -2	Dryer Line Double Duct Burners	--	--	1.80	1.07	0.16	0.16	0.16	0.013	0.12	2,582
ES-CLR1 through 6	Pellet Mills 1 through 12 and Pellet Coolers 1 through 6	CD-CLR-C1 through C4; CD-RCO	Multicyclones; Cyclones; RTO/RCO	22.4	6.58	4.98	4.98	4.98	0.051	37.5	10,263
ES-DSHM	Dry Shavings Hammermill	CD-DWDS-BV; CD-RCO	Bin Vent Filter; RTO/RCO								
ES-DWDS	Dried Wood Day Silo	CD-DWDS-BV; CD-RCO	Bin Vent Filter; RTO/RCO								
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BV	Baghouse	--	--	0.82	0.82	0.82	--	--	--
ES-FPH; ES-TLB; ES-PL1 and 2	Finished Product Handling; Twelve Truck Pellet Loadout Bins; Pellet Loadout 1 and 2	CD-FPH-BF	Baghouse	--	--	13.3	12.1	5.33	--	--	--
ES-FB	Fines Bin	CD-FB-BV	Baghouse	--	--	1.35	1.35	1.35	--	--	--
ES-DWH	Dried Wood Handling	--	--	--	--	0.072	0.034	0.0051	--	14.4	--
IES-ADD	Additive Handling and Storage	--	--	--	--	2.65E-04	1.25E-04	1.89E-05	--	--	--
ES-GWHS	Green Wood Handling and Storage	--	--	--	--	0.27	0.13	0.020	--	6.20	--
IES-GWFB[1]	Green Wood Fuel Storage Bin	--	--	--	--	--	--	--	--	--	--
IES-DRYSHAVE	Dry Shavings Handling and Storage	--	--	--	--	0.024	0.012	0.0017	--	--	--
IES-BARK	Electric Powered Bark Hog	--	--	--	--	1.83	1.01	--	--	0.23	--
IES-EG	Emergency Generator	--	--	0.50	0.58	0.029	0.029	0.029	0.0010	0.22	101
IES-FWP	Fire Water Pump	--	--	0.34	0.37	0.019	0.019	0.019	0.0006	0.02	67.3
IES-TK-1	Diesel Storage Tank for Emergency Generator	--	--	--	--	--	--	--	--	3.13E-04	--
IES-TK-2	Diesel Storage Tank for Fire Water Pump	--	--	--	--	--	--	--	--	1.45E-04	--
IES-TK-3	Diesel Storage Tank #3 (600 Gallon)	--	--	--	--	--	--	--	--	4.03E-04	--
IES-TK-4	Diesel Storage Tank #4 (1,000 Gallon)	--	--	--	--	--	--	--	--	6.31E-04	--
IES-CNGT[1]	Compressed Natural Gas Terminal	--	--	--	--	--	--	--	--	--	--
IES-BOIL-1 and IES-BOIL-2	Two (2) Natural Gas-fired Boilers	--	--	7.14	4.25	0.65	0.65	0.65	0.051	0.47	10,224
--	Haul Roads	--	--	--	--	23.4	4.47	0.52	--	--	--
			Total Emissions:	**174**	**146**	**79.7**	**58.2**	**46.0**	**19.4**	**132**	**238,661**
			Total Excluding Fugitives:	**174**	**146**	**56.0**	**53.6**	**45.5**	**19.4**	**125**	**238,661**
			PSD Major Source Threshold:	**250**	**250**	**250**	**250**	**250**	**250**	**250**	--

Notes:
[1] No quantifiable emissions. Considered insignificant activity per 15A NCAC 02Q .0503(8).

Table 2
Summary of Facility-wide HAP Potential Emissions
Enviva Pellets Ahoskie, LLC

Description	NC TAP	HAP	CD-RTO (tpy)	ES-FURNACEBYP-1 (tpy)	IES-DDB-1 and -2 (tpy)	CD-RCO (tpy)	ES-DWH (tpy)	IES-EG (tpy)	IES-FWP (tpy)	IES-BARK (tpy)	IES-BOIL-1 and -2 (tpy)	Total (tpy)	Major Source?
Acetaldehyde	Y	Y	1.57E+00	3.66E-03	3.26E-07	9.66E-01	1.11E-01	4.70E-04	3.14E-04	-	1.29E-06	2.65	No
Acrolein	Y	Y	6.73E+00	1.76E-02	3.86E-07	1.24E+00	-	5.67E-05	3.79E-05	-	1.53E-06	7.99	No
Formaldehyde	Y	Y	6.60E-01	1.94E-02	1.61E-03	9.26E-01	8.80E-02	7.23E-04	4.83E-04	-	6.38E-03	1.70	No
Methanol	N	Y	2.42E+00	-	-	1.33E+00	1.88E-01	-	-	4.57E-02	-	3.98	No
Phenol	Y	Y	7.23E-02	2.25E-04	-	1.91E+00	-	-	-	-	-	1.98	No
Propionaldehyde	N	Y	2.82E+00	2.69E-04	-	1.95E-01	3.24E-02	-	-	-	-	3.05	No
Acetophenone	N	Y	1.23E-07	1.41E-08	-	-	-	-	-	-	-	1.37E-07	No
Ammonia	Y	N	5.46E-01	-	6.87E-02	2.72E-01	-	-	-	-	2.72E-01	1.16E+00	No
Antimony & compounds	N	Y	3.03E-04	3.48E-05	-	-	-	-	-	-	-	3.38E-04	No
Arsenic & compounds	Y	Y	8.79E-04	9.70E-05	4.29E-06	1.70E-05	-	-	-	-	1.70E-05	1.01E-03	No
Benzene	Y	Y	1.62E-01	1.85E-02	4.51E-05	1.79E-04	-	5.71E-04	3.82E-04	-	1.79E-04	1.81E-01	No
Benzo(a)pyrene	Y	Y	1.00E-04	1.15E-05	2.58E-08	1.02E-07	-	1.15E-07	7.70E-08	-	1.02E-07	1.12E-04	No
Beryllium	Y	Y	4.43E-05	4.85E-06	2.58E-07	1.02E-06	-	-	-	-	1.02E-06	5.14E-05	No
1,3-Butadiene	Y	Y	-	-	-	-	-	2.39E-05	1.60E-05	-	-	4.00E-05	No
Cadmium	Y	Y	3.45E-04	1.81E-05	2.36E-05	9.35E-05	-	-	-	-	9.35E-05	5.74E-04	No
Carbon tetrachloride	Y	Y	1.73E-03	1.98E-04	-	-	-	-	-	-	-	1.93E-03	No
Chlorine	Y	Y	6.07E-01	3.48E-03	-	-	-	-	-	-	-	6.10E-01	No
Chlorobenzene	Y	Y	1.27E-03	1.45E-04	-	-	-	-	-	-	-	1.41E-03	No
Chloroform	Y	Y	1.07E-03	1.23E-04	-	-	-	-	-	-	-	1.20E-03	No
Chromium VI	Y	Y	3.73E-04	1.54E-05	3.01E-05	1.19E-04	-	-	-	-	-	5.38E-04	No
Chromium-Other compounds	N	Y	6.72E-04	7.71E-05	-	-	-	-	-	-	1.19E-04	8.68E-04	No
Cobalt compounds	N	Y	2.64E-04	2.86E-05	1.80E-06	7.14E-06	-	-	-	-	7.14E-06	3.09E-04	No
Dichlorobenzene	Y	Y	2.05E-04	-	2.58E-05	1.02E-04	-	-	-	-	1.02E-04	4.34E-04	No
Dichloroethane, 1,2-	Y	Y	1.11E-03	1.28E-04	-	-	-	-	-	-	-	1.24E-03	No
Dichloropropane, 1,2-	N	Y	1.27E-03	1.45E-04	-	-	-	-	-	-	-	1.41E-03	No
Dinitrophenol, 2,4-	N	Y	6.91E-06	7.93E-07	-	-	-	-	-	-	-	7.70E-06	No
Di(2-ethylhexyl)phthalate	Y	Y	1.80E-06	2.07E-07	-	-	-	-	-	-	-	2.01E-06	No
Ethyl benzene	N	Y	1.19E-03	1.37E-04	-	-	-	-	-	-	-	1.33E-03	No
Hexachlorodibenzo-p-dioxin	Y	N	6.14E-04	7.05E-06	-	-	-	-	-	-	-	6.21E-04	No
Hexane	Y	Y	3.07E-01	-	3.86E-02	1.53E-01	-	-	-	-	1.53E-01	6.52E-01	No
Hydrochloric acid	Y	Y	3.66E-01	8.37E-02	-	-	-	-	-	-	-	4.50E-01	No
Lead and lead compounds	Y	Y	1.93E-03	2.12E-04	1.07E-05	4.25E-05	-	-	-	-	4.25E-05	2.24E-03	No
Manganese & compounds	Y	Y	6.15E-02	7.05E-03	8.16E-06	3.23E-05	-	-	-	-	3.23E-05	6.86E-02	No
Mercury	Y	Y	1.79E-04	1.54E-05	5.58E-06	2.21E-05	-	-	-	-	2.21E-05	2.44E-04	No
Methyl bromide	N	Y	5.76E-04	6.61E-05	-	-	-	-	-	-	-	6.42E-04	No
Methyl chloride	N	Y	8.83E-04	1.01E-04	-	-	-	-	-	-	-	9.84E-04	No
Methyl ethyl ketone	Y	N	2.07E-04	2.38E-05	-	-	-	-	-	-	-	2.31E-04	No
Methylene chloride	N	Y	1.11E-02	1.28E-03	-	-	-	-	-	-	-	1.24E-02	No
Naphthalene	N	Y	3.83E-03	4.28E-04	1.31E-05	5.19E-05	-	-	-	-	5.19E-05	4.37E-03	No
Nickel	Y	Y	1.62E-03	1.45E-04	4.51E-05	1.79E-04	-	-	-	-	1.79E-04	2.17E-03	No
Nitrophenol, 4-	N	Y	4.22E-06	4.85E-07	-	-	-	-	-	-	-	4.71E-06	No
Pentachlorophenol	Y	Y	1.96E-06	2.25E-07	-	-	-	-	-	-	-	2.18E-06	No
Perchloroethylene	Y	Y	1.46E-03	1.67E-04	-	-	-	-	-	-	-	1.63E-03	No
Phosphorus metal, yellow or white	N	Y	1.04E-03	1.19E-04	-	-	-	-	-	-	-	1.16E-03	No
Polychlorinated biphenyls	Y	Y	3.13E-07	3.59E-08	-	-	-	-	-	-	-	3.49E-07	No
Polycyclic Organic Matter	N	Y	5.86E-03	5.50E-04	1.50E-05	5.94E-05	-	1.03E-04	6.88E-05	-	5.94E-05	6.71E-03	No
Selenium compounds	N	Y	1.12E-04	1.23E-05	5.15E-07	2.04E-06	-	-	-	-	2.04E-06	1.29E-04	No
Styrene	Y	Y	7.29E-02	8.37E-03	-	-	-	-	-	-	-	8.13E-02	No
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	Y	Y	3.30E-10	3.79E-11	-	-	-	-	-	-	-	3.68E-10	No
Toluene	Y	Y	3.59E-02	4.05E-03	7.30E-05	2.89E-04	-	2.51E-04	1.67E-04	-	2.89E-04	4.10E-02	No
Trichloroethane, 1,1,1-	Y	Y	1.19E-03	1.37E-04	-	-	-	-	-	-	-	1.33E-03	No
Trichloroethylene	Y	Y	1.15E-03	1.32E-04	-	-	-	-	-	-	-	1.28E-03	No
Trichlorofluoromethane	Y	N	1.57E-03	1.81E-04	-	-	-	-	-	-	-	1.75E-03	No
Trichlorophenol, 2,4,6-	N	Y	8.45E-07	9.70E-08	-	-	-	-	-	-	-	9.42E-07	No
Vinyl chloride	Y	Y	6.91E-04	7.93E-05	-	-	-	-	-	-	-	7.70E-04	No
Xylene	Y	Y	9.60E-04	1.10E-04	-	-	-	1.75E-04	1.17E-04	-	-	1.36E-03	No
Total HAP Emissions (tpy):			**15.9**	**0.17**	**0.041**	**6.73**	**0.42**	**0.0024**	**0.0016**	**0.046**	**0.16**	**23.5**	No
Maximum Individual HAP:			**Acrolein**	**Hydrochloric acid**	**Hexane**	**Phenol**	**Methanol**	**Formaldehyde**	**Formaldehyde**	**Methanol**	**Hexane**	**Acrolein**	--
Maximum Individual HAP Emissions (tpy):			**6.73**	**0.084**	**0.039**	**1.91**	**0.19**	**7.23E-04**	**4.83E-04**	**0.046**	**0.15**	**7.99**	No
Total TAP (tpy):			**11.2**	**0.17**	**0.11**	**5.47**	**0.20**	**0.0023**	**0.0015**	**0**	**0.43**	**17.6**	No

Table 3a
Potential Emissions from Dryer Line RTO Stack (CD-RTO)
Enviva Pellets Ahoskie, LLC

Calculation Basis

Annual Throughput of Dryer	550,000	ODT/year
Max. Hourly Throughput of Dryer	62.8	ODT/hr
Burner Heat Input	175.3	MMBtu/hr
Annual Heat Input	1,535,628	MMBtu/yr
Annual Throughput of GHMs and DHMs	550,000	ODT/yr
Hourly Throughput of GHMs and DHMs	62.8	ODT/hr
Annual Operation	8,760	hr/yr
Total RTO Heat Input	40	MMBtu/hr
RTO Control Efficiency	95	%
WESP Control Efficiency	95	%

Total Potential Emissions at RTO Stack

Pollutant	Potential Emissions[1]	
	(lb/hr)	(tpy)
CO	31.7	139
NO_x	30.2	132
SO_2	4.38	19.2
VOC	16.5	72.3
Total PM	6.89	30.2
Total PM_{10}	6.89	30.2
Total $PM_{2.5}$	6.89	30.2
CO_2e	48,973	214,500
Total HAP	3.63	15.9
Total TAP	2.56	11.2

Notes:

[1] Total emissions from the furnace/dryer, green hammermills, dry hammermills, and natural gas combustion by the RTO (includes injection gas and burner fuel). Detailed calculations are provided below.

Potential Criteria Pollutant and Greenhouse Gas Emissions - Furnace/Dryer, Green Hammermills, and Dry Hammermills

Pollutant	Controlled Emission Factor	Units	Potential Emissions from Furnace/Dryer, GHMs, and DHMs[1]	
			(lb/hr)	(tpy)
CO	0.50	lb/ODT[2]	31.2	137
NO_x	0.47	lb/ODT[2]	29.6	130
SO_2	0.025	lb/MMBtu[3]	4.38	19.2
Total VOC as Propane	0.26	lb/ODT[2]	16.5	72.3
$PM/PM_{10}/PM_{2.5}$ (Filterable + Condensable)	0.11	lb/ODT[2]	6.89	30.2
CO_2	780	lb/ODT[4]	48,973	214,500

Notes:

[1] Exhaust from the dryer is routed to twin cyclones for material recovery purposes then to a WESP and RTO for control of VOC, HAP, and particulates.

[2] Emission factor based on process information and an appropriate contingency based on engineering judgement.

[3] No emission factor is provided in AP-42, Section 10.6.2 for SO_2 for rotary dryers. Enviva has conservatively calculated SO_2 emissions based on AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.

[4] Emission factor for CO_2 from AP-42, Section 10.6.1 for rotary dryer with RTO control device. Enviva has conservatively calculated the CO_2 emissions using the hardwood emission factor because the dryer at the Ahoskie plant will use a combination of hardwood and softwood and the hardwood emission factor is greater than the softwood emission factor.

Thermally Generated Potential Criteria Pollutant Emissions from Combustion of VOC from Dry Hammermills

Maximum high heating value of VOC constituents	0.018 MMBtu/lb
Uncontrolled VOC emissions from DHMs	330.3 lb/hr
Hourly Heat Input of uncontrolled VOC emissions	6.11 MMBtu/hr
Uncontrolled VOC emissions from DHMs	1447 tpy
Annual Heat Input of uncontrolled VOC emissions	53,510 MMBtu/yr

Pollutant	Emission Factor	Units	Potential Emissions	
			(lb/hr)	(tpy)
CO	0.082	lb/MMBtu[1]	0.50	2.20
NO_x	0.10	lb/MMBtu[1]	0.60	2.62

Notes:

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

Table 3a
Potential Emissions from Dryer Line RTO Stack (CD-RTO)
Enviva Pellets Ahoskie, LLC

Potential HAP Emissions

Pollutant	HAP	NC TAP	Emission Factor	Units	Footnote	Potential Emissions	
						(lb/hr)	(tpy)
Furnace Biomass Combustion, Drying, Green Hammermills, and Dry Hammermills[8]							
Acetaldehyde	Y	Y	5.69E-03	lb/ODT	1	0.36	1.57
Acrolein	Y	Y	2.45E-02	lb/ODT	1	1.54	6.73
Formaldehyde	Y	Y	2.40E-03	lb/ODT	1	0.15	0.66
Methanol	Y	N	8.79E-03	lb/ODT	1	0.55	2.42
Phenol	Y	Y	2.63E-04	lb/ODT	1	0.017	0.072
Propionaldehyde	Y	N	1.03E-02	lb/ODT	1	0.64	2.82
Acetophenone	Y	N	3.20E-09	lb/MMBtu	2,3	2.80E-08	1.23E-07
Antimony & Compounds	Y	N	7.90E-06	lb/MMBtu	2,4	6.92E-05	3.03E-04
Arsenic & Compounds	Y	Y	2.20E-05	lb/MMBtu	2,4	1.93E-04	8.45E-04
Benzene	Y	Y	4.20E-03	lb/MMBtu	2,3	3.68E-02	1.61E-01
Benzo(a)pyrene	Y	Y	2.60E-06	lb/MMBtu	2,3	2.28E-05	9.98E-05
Beryllium	Y	Y	1.10E-06	lb/MMBtu	2,4	9.64E-06	4.22E-05
Cadmium	Y	Y	4.10E-06	lb/MMBtu	2,4	3.59E-05	1.57E-04
Carbon tetrachloride	Y	Y	4.50E-05	lb/MMBtu	2,3	3.94E-04	1.73E-03
Chlorine	Y	Y	7.90E-04	lb/MMBtu	2	1.38E-01	6.07E-01
Chlorobenzene	Y	Y	3.30E-05	lb/MMBtu	2,3	2.89E-04	1.27E-03
Chloroform	Y	Y	2.80E-05	lb/MMBtu	2,3	2.45E-04	1.07E-03
Chromium VI	-[7]	Y	3.50E-06	lb/MMBtu	2,4	3.07E-05	1.34E-04
Chromium--Other compounds	Y	N	1.75E-05	lb/MMBtu	2,4	1.53E-04	6.72E-04
Cobalt compounds	Y	N	6.50E-06	lb/MMBtu	2,4	5.70E-05	2.50E-04
Dichloroethane, 1,2-	Y	Y	2.90E-05	lb/MMBtu	2,3	2.54E-04	1.11E-03
Dichloropropane, 1,2-	Y	N	3.30E-05	lb/MMBtu	2,3	2.89E-04	1.27E-03
Dinitrophenol, 2,4-	Y	N	1.80E-07	lb/MMBtu	2,3	1.58E-06	6.91E-06
Di(2-ethylhexyl)phthalate	Y	Y	4.70E-08	lb/MMBtu	2,3	4.12E-07	1.80E-06
Ethyl benzene	Y	N	3.10E-05	lb/MMBtu	2,3	2.72E-04	1.19E-03
Hexachlorodibenzo-p-dioxin	N	Y	1.60E-05	lb/MMBtu	2,3	1.40E-04	6.14E-04
Hydrochloric acid	Y	Y	1.33E-03	lb/ODT	1,5	8.36E-02	3.66E-01
Lead and Lead compounds	Y	N	4.80E-05	lb/MMBtu	2,4	4.21E-04	1.84E-03
Manganese & compounds	Y	Y	1.60E-03	lb/MMBtu	2,4	1.40E-02	6.14E-02
Mercury	Y	Y	3.50E-06	lb/MMBtu	2,4	3.07E-05	1.34E-04
Methyl bromide	Y	N	1.50E-05	lb/MMBtu	2,3	1.31E-04	5.76E-04
Methyl chloride	Y	N	2.30E-05	lb/MMBtu	2,3	2.02E-04	8.83E-04
Methyl ethyl ketone	N	Y	5.40E-06	lb/MMBtu	2,3	4.73E-05	2.07E-04
Methylene chloride	Y	Y	2.90E-04	lb/MMBtu	2,3	2.54E-03	1.11E-02
Naphthalene	Y	N	9.70E-05	lb/MMBtu	2,3	8.50E-04	3.72E-03
Nickel	Y	Y	3.30E-05	lb/MMBtu	2,4	2.89E-04	1.27E-03
Nitrophenol, 4-	Y	N	1.10E-07	lb/MMBtu	2,3	9.64E-07	4.22E-06
Pentachlorophenol	Y	Y	5.10E-08	lb/MMBtu	2,3	4.47E-07	1.96E-06
Perchloroethylene	Y	Y	3.80E-05	lb/MMBtu	2,3	3.33E-04	1.46E-03
Phosphorus Metal, Yellow or White	Y	N	2.70E-05	lb/MMBtu	2,4	2.37E-04	1.04E-03
Polychlorinated biphenyls	Y	Y	8.15E-09	lb/MMBtu	2,3	7.14E-08	3.13E-07
Polycyclic Organic Matter	Y	N	1.25E-04	lb/MMBtu	2,3	1.09E-03	4.79E-03
Selenium compounds	Y	N	2.80E-06	lb/MMBtu	2,4	2.45E-05	1.07E-04
Styrene	Y	Y	1.90E-03	lb/MMBtu	2,3	1.67E-02	7.29E-02
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	Y	Y	8.60E-12	lb/MMBtu	2,3	7.54E-11	3.30E-10
Toluene	Y	Y	9.20E-04	lb/MMBtu	2,3	8.06E-03	3.53E-02
Trichloroethane, 1,1,1-	Y	Y	3.10E-05	lb/MMBtu	2,3	2.72E-04	1.19E-03
Trichloroethylene	Y	Y	3.00E-05	lb/MMBtu	2,3	2.63E-04	1.15E-03
Trichlorofluoromethane	N	Y	4.10E-05	lb/MMBtu	2,3	3.59E-04	1.57E-03
Trichlorophenol, 2,4,6-	Y	N	2.20E-08	lb/MMBtu	2,3	1.93E-07	8.45E-07
Vinyl chloride	Y	Y	1.80E-05	lb/MMBtu	2,3	1.58E-04	6.91E-04
Xylene	Y	Y	2.50E-05	lb/MMBtu	2,3	2.19E-04	9.60E-04
					Total HAP Emissions:	**3.56**	**15.6**
					Total TAP Emissions:	**2.36**	**10.4**

Notes:

[1] Emission factor based on process information and an appropriate contingency based on engineering judgement.

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

[3] A control efficiency of 95% for the RTOs is applied to all organic HAP for those emission factors that are not derived from Enviva stack test data. This is the expected control efficiency of the RTO.

[4] A 95% control efficiency for the wet electrostatic precipitator (WESP) is applied to all metal HAP based on expected control efficiency for the WESP.

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

[6] The emissions from the Green Hammermills and Dry Hammermills will be routed through the Dryer Line WESP and RTO.

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

Table 3a
Potential Emissions from Dryer Line RTO Stack (CD-RTO)
Enviva Pellets Ahoskie, LLC

Potential HAP Emissions - RTO Burners

Pollutant	HAP	NC TAP	Emission Factor[1]	Units	Potential Emissions	
					(lb/hr)	(tpy)
RTO Natural Gas Combustion						
2-Methylnaphthalene	Y	N	2.40E-05	lb/MMscf	9.34E-07	4.09E-06
3-Methylchloranthrene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
7,12-Dimethylbenz(a)anthracene	Y	N	1.60E-05	lb/MMscf	6.23E-07	2.73E-06
Acenaphthene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
Acenaphthylene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
Ammonia	N	Y	3.2	lb/MMscf	1.25E-01	5.46E-01
Anthracene	Y	N	2.40E-06	lb/MMscf	9.34E-08	4.09E-07
Arsenic & Compounds	Y	Y	2.00E-04	lb/MMscf	7.78E-06	3.41E-05
Benz(a)anthracene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
Benzene	Y	Y	2.10E-03	lb/MMscf	8.17E-05	3.58E-04
Benzo(a)pyrene	Y	Y	1.20E-06	lb/MMscf	4.67E-08	2.05E-07
Benzo(b)fluoranthene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
Benzo(g,h,i)perylene	Y	N	1.20E-06	lb/MMscf	4.67E-08	2.05E-07
Benzo(k)fluoranthene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
Beryllium	Y	Y	1.20E-05	lb/MMscf	4.67E-07	2.05E-06
Cadmium	Y	Y	1.10E-03	lb/MMscf	4.28E-05	1.88E-04
Chromium VI	Y	N	1.40E-03	lb/MMscf	5.45E-05	2.39E-04
Chrysene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
Cobalt compounds	Y	N	8.40E-05	lb/MMscf	3.27E-06	1.43E-05
Dibenzo(a,h)anthracene	Y	N	1.20E-06	lb/MMscf	4.67E-08	2.05E-07
Dichlorobenzene	Y	Y	1.20E-03	lb/MMscf	4.67E-05	2.05E-04
Fluoranthene	Y	N	3.00E-06	lb/MMscf	1.17E-07	5.11E-07
Fluorene	Y	N	2.80E-06	lb/MMscf	1.09E-07	4.77E-07
Hexane	Y	Y	1.80	lb/MMscf	7.01E-02	3.07E-01
Indeno(1,2,3-cd)pyrene	Y	N	1.80E-06	lb/MMscf	7.01E-08	3.07E-07
Lead and Lead compounds	Y	N	5.00E-04	lb/MMscf	1.95E-05	8.52E-05
Manganese & compounds	Y	Y	3.80E-04	lb/MMscf	1.48E-05	6.48E-05
Mercury	Y	Y	2.60E-04	lb/MMscf	1.01E-05	4.43E-05
Naphthalene	Y	N	6.10E-04	lb/MMscf	2.37E-05	1.04E-04
Nickel	Y	Y	2.10E-03	lb/MMscf	8.17E-05	3.58E-04
Phenanthrene	Y	N	1.70E-05	lb/MMscf	6.62E-07	2.90E-06
Pyrene	Y	N	5.00E-06	lb/MMscf	1.95E-07	8.52E-07
Selenium Compounds	Y	N	2.40E-05	lb/MMscf	9.34E-07	4.09E-06
Toluene	Y	Y	3.40E-03	lb/MMscf	1.32E-04	5.80E-04
				Total HAP Emissions	**0.071**	**0.31**
				Total TAP Emissions	**0.20**	**0.85**

Notes:

[1] Emission factors for natural gas combustion are from NCDAQ Natural Gas Combustion Spreadsheet and AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98. The emission factor for ammonia is cited in the NCDAQ spreadsheet as being sourced from the USEPA's WebFIRE database. Acetaldehyde, acrolein, and formaldehyde are not included in this table because emissions of these pollutants resulting from RTO fuel combustion are already reflected in the lb/ODT emission factors.

Abbreviations:

CH_4 - methane
CO - carbon monoxide
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
GHM - Green Hammermill
HAP - hazardous air pollutant
hr - hour
kg - kilogram
lb - pound
Mgal - thousand gallons
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NO_x - nitrogen oxides
N_2O - nitrous oxide
ODT - oven dried short tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
RTO - regenerative thermal oxidizer
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
WESP - wet electrostatic precipitator
yr - year

References:

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

Table 3b
Potential Emissions from Furnace Bypass (Cold Start-up)
Enviva Pellets Ahoskie, LLC

Calculation Basis

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

Potential Criteria Pollutant and Greenhouse Gas Emissions - Furnace Bypass Cold Start-up

Pollutant	Emission Factor	Units	Potential Emissions	
			(lb/hr)	(tpy)
CO	0.60	lb/MMBtu[1]	15.8	0.39
NO_X	0.22	lb/MMBtu[1]	5.78	0.14
SO_2	0.025	lb/MMBtu[1]	0.66	0.016
VOC	0.017	lb/MMBtu[1]	0.45	0.011
Total PM	0.58	lb/MMBtu[1]	15.2	0.38
Total PM_{10}	0.52	lb/MMBtu[1]	13.6	0.34
Total $PM_{2.5}$	0.45	lb/MMBtu[1]	11.8	0.29
CO_2	93.8	kg/MMBtu[2]	5,438	136
CH_4	0.0072	kg/MMBtu[2]	0.42	0.010
N_2O	0.0036	kg/MMBtu[2]	0.21	0.0052
CO_2e			5,510	138

Notes:

1. CO, NO_X, SO_2, PM, PM_{10}, $PM_{2.5}$, and VOC emission rates based on AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03 for bark/bark and wet wood-fired boilers. PM, PM_{10}, and $PM_{2.5}$ factors equal to the sum of the filterable and condensable factors from Table 1.6-1. VOC emission factor excludes formaldehyde.
2. Emission factors for biomass combustion from Table C-1 and C-2 of 40 CFR Part 98 and Global Warming Potentials from Table A-1.

Table 3b
Potential Emissions from Furnace Bypass (Cold Start-up)
Enviva Pellets Ahoskie, LLC

Potential HAP Emissions - Furnace Bypass Cold Start-up

Pollutant	HAP	NC TAP	Emission Factor[1]	Units	Potential Emissions	
					(lb/hr)	(tpy)
Acetaldehyde	Y	Y	8.30E-04	lb/MMBtu	2.18E-02	5.46E-04
Acrolein	Y	Y	4.00E-03	lb/MMBtu	1.05E-01	2.63E-03
Formaldehyde	Y	Y	4.40E-03	lb/MMBtu	1.16E-01	2.89E-03
Phenol	Y	Y	5.10E-05	lb/MMBtu	1.34E-03	3.35E-05
Propionaldehyde	Y	N	6.10E-05	lb/MMBtu	1.60E-03	4.01E-05
Acetophenone	Y	N	3.20E-09	lb/MMBtu	8.41E-08	2.10E-09
Antimony & Compounds	Y	N	7.90E-06	lb/MMBtu	2.08E-04	5.19E-06
Arsenic & Compounds	Y	Y	2.20E-05	lb/MMBtu	5.78E-04	1.45E-05
Benzene	Y	Y	4.20E-03	lb/MMBtu	1.10E-01	2.76E-03
Benzo(a)pyrene	Y	Y	2.60E-06	lb/MMBtu	6.84E-05	1.71E-06
Beryllium	Y	Y	1.10E-06	lb/MMBtu	2.89E-05	7.23E-07
Cadmium	Y	Y	4.10E-06	lb/MMBtu	1.08E-04	2.70E-06
Carbon tetrachloride	Y	Y	4.50E-05	lb/MMBtu	1.18E-03	2.96E-05
Chlorine	Y	Y	7.90E-04	lb/MMBtu	2.08E-02	5.19E-04
Chlorobenzene	Y	Y	3.30E-05	lb/MMBtu	8.68E-04	2.17E-05
Chloroform	Y	Y	2.80E-05	lb/MMBtu	7.36E-04	1.84E-05
Chromium VI	-[2]	Y	3.50E-06	lb/MMBtu	9.20E-05	2.30E-06
Chromium--Other compounds	Y	N	1.75E-05	lb/MMBtu	4.60E-04	1.15E-05
Cobalt compounds	Y	N	6.50E-06	lb/MMBtu	1.71E-04	4.27E-06
Dichloroethane, 1,2-	Y	Y	2.90E-05	lb/MMBtu	7.63E-04	1.91E-05
Dichloropropane, 1,2-	Y	N	3.30E-05	lb/MMBtu	8.68E-04	2.17E-05
Dinitrophenol, 2,4-	Y	N	1.80E-07	lb/MMBtu	4.73E-06	1.18E-07
Di(2-ethylhexyl)phthalate	Y	Y	4.70E-08	lb/MMBtu	1.24E-06	3.09E-08
Ethyl benzene	Y	N	3.10E-05	lb/MMBtu	8.15E-04	2.04E-05
Hexachlorodibenzo-p-dioxin	N	Y	1.60E-06	lb/MMBtu	4.21E-05	1.05E-06
Hydrochloric acid	Y	Y	1.90E-02	lb/MMBtu	5.00E-01	1.25E-02
Lead and Lead compounds	Y	N	4.80E-05	lb/MMBtu	1.26E-03	3.16E-05
Manganese & compounds	Y	Y	1.60E-03	lb/MMBtu	4.21E-02	1.05E-03
Mercury	Y	Y	3.50E-06	lb/MMBtu	9.20E-05	2.30E-06
Methyl bromide	Y	N	1.50E-05	lb/MMBtu	3.94E-04	9.86E-06
Methyl chloride	Y	N	2.30E-05	lb/MMBtu	6.05E-04	1.51E-05
Methyl ethyl ketone	N	Y	5.40E-06	lb/MMBtu	1.42E-04	3.55E-06
Methylene chloride	Y	Y	2.90E-04	lb/MMBtu	7.63E-03	1.91E-04
Naphthalene	Y	N	9.70E-05	lb/MMBtu	2.55E-03	6.38E-05
Nickel	Y	Y	3.30E-05	lb/MMBtu	8.68E-04	2.17E-05
Nitrophenol, 4-	Y	N	1.10E-07	lb/MMBtu	2.89E-06	7.23E-08
Pentachlorophenol	Y	Y	5.10E-08	lb/MMBtu	1.34E-06	3.35E-08
Perchloroethylene	Y	Y	3.80E-05	lb/MMBtu	9.99E-04	2.50E-05
Phosphorus Metal, Yellow or White	Y	N	2.70E-05	lb/MMBtu	7.10E-04	1.77E-05
Polychlorinated biphenyls	Y	Y	8.15E-09	lb/MMBtu	2.14E-07	5.35E-09
Polycyclic Organic Matter	Y	N	1.25E-04	lb/MMBtu	3.28E-03	8.20E-05
Selenium compounds	Y	N	2.80E-06	lb/MMBtu	7.36E-05	1.84E-06
Styrene	Y	Y	1.90E-03	lb/MMBtu	5.00E-02	1.25E-03
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	Y	Y	8.60E-12	lb/MMBtu	2.26E-10	5.65E-12
Toluene	Y	Y	9.20E-04	lb/MMBtu	2.42E-02	6.05E-04
Trichloroethane, 1,1,1-	Y	Y	3.10E-05	lb/MMBtu	8.15E-04	2.04E-05
Trichloroethylene	Y	Y	3.00E-05	lb/MMBtu	7.89E-04	1.97E-05
Trichlorofluoromethane	N	Y	4.10E-05	lb/MMBtu	1.08E-03	2.70E-05
Trichlorophenol, 2,4,6-	Y	N	2.20E-08	lb/MMBtu	5.78E-07	1.45E-08
Vinyl chloride	Y	Y	1.80E-05	lb/MMBtu	4.73E-04	1.18E-05
Xylene	Y	Y	2.50E-05	lb/MMBtu	6.57E-04	1.64E-05
				Total HAP Emissions:	**1.02**	**0.025**
				Total TAP Emissions:	**1.01**	**0.025**

Notes:
1. Emission factors for wood combustion in a stoker boiler from AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.
2. Chromium VI is a subset of chromium compounds, which is accounted for separately as a HAP. As such, Chromium VI is only calculated as a TAP.

Abbreviations:

CH_4 - methane
CO - carbon monoxide
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
HAP - hazardous air pollutant
hr - hour
kg - kilogram
lb - pound
MMBtu - Million British thermal units
NC - North Carolina
NO_x - nitrogen oxides
N_2O - nitrous oxide
ODT - oven dried short tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
TAP - Toxic Air Pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

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

Table 3c
Potential Emissions from Furnace Bypass (Idle Mode)
Enviva Pellets Ahoskie, LLC

Calculation Basis

Avg. and Max. Hourly Heat Input Capacity[1]	15 MMBtu/hr
Annual Heat Input Capacity	7,500 MMBtu/yr
Hours of Operation[1]	500 hr/yr

Potential Criteria Pollutant and Greenhouse Gas Emissions - Furnace Bypass "Idle Mode"

Pollutant	Emission Factor	Units	Potential Emissions	
			(lb/hr)	(tpy)
CO	0.60	lb/MMBtu[2]	9.00	2.25
NO_X	0.22	lb/MMBtu[2]	3.30	0.83
SO_2	0.025	lb/MMBtu[2]	0.38	0.094
VOC	0.017	lb/MMBtu[2]	0.26	0.064
Total PM	0.58	lb/MMBtu[2]	8.66	2.16
Total PM_{10}	0.52	lb/MMBtu[2]	7.76	1.94
Total $PM_{2.5}$	0.45	lb/MMBtu[2]	6.71	1.68
CO_2	93.8	kg/MMBtu[3]	3,102	775
CH_4	0.0072	kg/MMBtu[3]	0.24	0.060
N_2O	0.0036	kg/MMBtu[3]	0.12	0.030
CO_2e			3,143	786

Notes:

1. The furnace may operate in idle mode for up to 500 hr/yr.
2. CO, NO_X, SO_2, PM, PM_{10}, $PM_{2.5}$, and VOC emission rates based on AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03 for bark/bark and wet wood-fired boilers. PM, PM_{10}, and $PM_{2.5}$ factors equal to the sum of the filterable and condensable factors from Table 1.6-1.
3. Emission factors for biomass combustion from Table C-1 and C-2 of 40 CFR Part 98 and Global Warming Potentials from Table A-1.

Table 3c
Potential Emissions from Furnace Bypass (Idle Mode)
Enviva Pellets Ahoskie, LLC

Potential HAP Emissions - Furnace Bypass "Idle Mode"

Pollutant	HAP	NC TAP	Emission Factor[1]	Units	Potential Emissions	
					(lb/hr)	(tpy)
Acetaldehyde	Y	Y	8.30E-04	lb/MMBtu	1.25E-02	3.11E-03
Acrolein	Y	Y	4.00E-03	lb/MMBtu	6.00E-02	1.50E-02
Formaldehyde	Y	Y	4.40E-03	lb/MMBtu	6.60E-02	1.65E-02
Phenol	Y	Y	5.10E-05	lb/MMBtu	7.65E-04	1.91E-04
Propionaldehyde	Y	N	6.10E-05	lb/MMBtu	9.15E-04	2.29E-04
Acetophenone	Y	N	3.20E-09	lb/MMBtu	4.80E-08	1.20E-08
Antimony & Compounds	Y	N	7.90E-06	lb/MMBtu	1.19E-04	2.96E-05
Arsenic & Compounds	Y	Y	2.20E-05	lb/MMBtu	3.30E-04	8.25E-05
Benzene	Y	Y	4.20E-03	lb/MMBtu	6.30E-02	1.58E-02
Benzo(a)pyrene	Y	Y	2.60E-06	lb/MMBtu	3.90E-05	9.75E-06
Beryllium	Y	Y	1.10E-06	lb/MMBtu	1.65E-05	4.13E-06
Cadmium	Y	Y	4.10E-06	lb/MMBtu	6.15E-05	1.54E-05
Carbon tetrachloride	Y	Y	4.50E-05	lb/MMBtu	6.75E-04	1.69E-04
Chlorine	Y	Y	7.90E-04	lb/MMBtu	1.19E-02	2.96E-03
Chlorobenzene	Y	Y	3.30E-05	lb/MMBtu	4.95E-04	1.24E-04
Chloroform	Y	Y	2.80E-05	lb/MMBtu	4.20E-04	1.05E-04
Chromium VI	-[2]	Y	3.50E-06	lb/MMBtu	5.25E-05	1.31E-05
Chromium--Other compounds	Y	N	1.75E-05	lb/MMBtu	2.63E-04	6.56E-05
Cobalt compounds	Y	N	6.50E-06	lb/MMBtu	9.75E-05	2.44E-05
Dichloroethane, 1,2-	Y	Y	2.90E-05	lb/MMBtu	4.35E-04	1.09E-04
Dichloropropane, 1,2-	Y	N	3.30E-05	lb/MMBtu	4.95E-04	1.24E-04
Dinitrophenol, 2,4-	Y	N	1.80E-07	lb/MMBtu	2.70E-06	6.75E-07
Di(2-ethylhexyl)phthalate	Y	Y	4.70E-08	lb/MMBtu	7.05E-07	1.76E-07
Ethyl benzene	Y	N	3.10E-05	lb/MMBtu	4.65E-04	1.16E-04
Hexachlorodibenzo-p-dioxin	N	Y	1.60E-06	lb/MMBtu	2.40E-05	6.00E-06
Hydrochloric acid	Y	Y	1.90E-02	lb/MMBtu	2.85E-01	7.13E-02
Lead and Lead compounds	Y	N	4.80E-05	lb/MMBtu	7.20E-04	1.80E-04
Manganese & compounds	Y	Y	1.60E-03	lb/MMBtu	2.40E-02	6.00E-03
Mercury	Y	Y	3.50E-06	lb/MMBtu	5.25E-05	1.31E-05
Methyl bromide	Y	N	1.50E-05	lb/MMBtu	2.25E-04	5.63E-05
Methyl chloride	Y	N	2.30E-05	lb/MMBtu	3.45E-04	8.63E-05
Methyl ethyl ketone	N	Y	5.40E-06	lb/MMBtu	8.10E-05	2.03E-05
Methylene chloride	Y	Y	2.90E-04	lb/MMBtu	4.35E-03	1.09E-03
Naphthalene	Y	N	9.70E-05	lb/MMBtu	1.46E-03	3.64E-04
Nickel	Y	Y	3.30E-05	lb/MMBtu	4.95E-04	1.24E-04
Nitrophenol, 4-	Y	N	1.10E-07	lb/MMBtu	1.65E-06	4.13E-07
Pentachlorophenol	Y	Y	5.10E-08	lb/MMBtu	7.65E-07	1.91E-07
Perchloroethylene	Y	Y	3.80E-05	lb/MMBtu	5.70E-04	1.43E-04
Phosphorus Metal, Yellow or White	Y	N	2.70E-05	lb/MMBtu	4.05E-04	1.01E-04
Polychlorinated biphenyls	Y	Y	8.15E-09	lb/MMBtu	1.22E-07	3.05E-08
Polycyclic Organic Matter	Y	N	1.25E-04	lb/MMBtu	1.87E-03	4.68E-04
Selenium compounds	Y	N	2.80E-06	lb/MMBtu	4.20E-05	1.05E-05
Styrene	Y	Y	1.90E-03	lb/MMBtu	2.85E-02	7.13E-03
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	Y	Y	8.60E-12	lb/MMBtu	1.29E-10	3.23E-11
Toluene	Y	Y	9.20E-04	lb/MMBtu	1.38E-02	3.45E-03
Trichloroethane, 1,1,1-	Y	Y	3.10E-05	lb/MMBtu	4.65E-04	1.16E-04
Trichloroethylene	Y	Y	3.00E-05	lb/MMBtu	4.50E-04	1.13E-04
Trichlorofluoromethane	N	Y	4.10E-05	lb/MMBtu	6.15E-04	1.54E-04
Trichlorophenol, 2,4,6-	Y	N	2.20E-08	lb/MMBtu	3.30E-07	8.25E-08
Vinyl chloride	Y	Y	1.80E-05	lb/MMBtu	2.70E-04	6.75E-05
Xylene	Y	Y	2.50E-05	lb/MMBtu	3.75E-04	9.38E-05
				Total HAP Emissions:	**0.58**	**0.15**
				Total TAP Emissions:	**0.58**	**0.14**

Notes:
[1] Emission factors for wood combustion in a stoker boiler from AP-42, Section 1.6 - Wood Residue Combustion in Boilers, 09/03.
[2] Chromium VI is a subset of chromium compounds, which is accounted for separately as a HAP. As such, Chromium VI is only calculated as a TAP.

Abbreviations:
CH_4 - methane
CO - carbon monoxide
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
HAP - hazardous air pollutant
hr - hour
kg - kilogram
lb - pound
MMBtu - Million British thermal units
NC - North Carolina
NO_x - nitrogen oxides
N_2O - nitrous oxide
ODT - oven dried short tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
TAP - Toxic Air Pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

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

Table 4
Potential Emissions from Double Duct Burners (IES-DDB-1 and -2)
Enviva Pellets Ahoskie, LLC

Duct Burner Inputs

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

Potential Criteria Pollutant Emissions - Natural Gas Combustion

Pollutant	Emission Factor	Units	Footnote	Potential Emissions	
				Hourly (lb/hr)	Annual (tpy)
CO	84.0	lb/MMscf	1	0.41	1.80
NO_X	50.0	lb/MMscf	2	0.25	1.07
SO_2	0.60	lb/MMscf	1	0.0029	0.013
VOC	5.50	lb/MMscf	1	0.027	0.118
$PM/PM_{10}/PM_{2.5}$ Condensable	5.70	lb/MMscf	1	0.028	0.122
$PM/PM_{10}/PM_{2.5}$ Filterable	1.90	lb/MMscf	1	0.0093	0.041
			Total $PM/PM_{10}/PM_{2.5}$	0.037	0.16
CO_2	120,000	lb/MMscf	1	588	2,576
CH_4	2.30	lb/MMscf	1	0.0113	0.049
N_2O[2]	0.64	lb/MMscf	1,2	0.0031	0.014
CO_2e	--	--	3	589	2,582

Notes:

1. Emission factors for natural gas combustion from AP-42 Section 1.4 - Natural Gas Combustion, 07/98. Natural gas heating value of 1,020 Btu/scf assumed per AP-42.
2. Emission factors for NO_X and N_2O assume burners are low-NO_X burners.
3. CO_2e emissions were estimated based on the Global Warming Potentials listed in Table A-1 of 40 CFR 98 Subpart A.

Table 4
Potential Emissions from Double Duct Burners (IES-DDB-1 and -2)
Enviva Pellets Ahoskie, LLC

Potential HAP and TAP Emissions

Pollutant	HAP	NC TAP	Emission Factor[1]	Units	Potential Emissions (lb/hr)	Potential Emissions (tpy)
Natural Gas Combustion						
2-Methylnaphthalene	Y	N	2.40E-05	lb/MMscf	1.18E-07	5.15E-07
3-Methylchloranthrene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
7,12-Dimethylbenz(a)anthracene	Y	N	1.60E-05	lb/MMscf	7.84E-08	3.44E-07
Acenaphthene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
Acenaphthylene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
Acetaldehyde	Y	Y	1.52E-05	lb/MMscf	7.45E-08	3.26E-07
Acrolein	Y	Y	1.80E-05	lb/MMscf	8.82E-08	3.86E-07
Ammonia	N	Y	3.20E+00	lb/MMscf	1.57E-02	6.87E-02
Anthracene	Y	N	2.40E-06	lb/MMscf	1.18E-08	5.15E-08
Arsenic & Compounds	Y	Y	2.00E-04	lb/MMscf	9.80E-07	4.29E-06
Benz(a)anthracene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
Benzene	Y	Y	2.10E-03	lb/MMscf	1.03E-05	4.51E-05
Benzo(a)pyrene	Y	Y	1.20E-06	lb/MMscf	5.88E-09	2.58E-08
Benzo(b)fluoranthene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
Benzo(g,h,i)perylene	Y	N	1.20E-06	lb/MMscf	5.88E-09	2.58E-08
Benzo(k)fluoranthene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
Beryllium	Y	Y	1.20E-05	lb/MMscf	5.88E-08	2.58E-07
Cadmium	Y	Y	1.10E-03	lb/MMscf	5.39E-06	2.36E-05
Chromium VI	Y	N	1.40E-03	lb/MMscf	6.86E-06	3.01E-05
Chrysene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
Cobalt compounds	Y	N	8.40E-05	lb/MMscf	4.12E-07	1.80E-06
Dibenzo(a,h)anthracene	Y	N	1.20E-06	lb/MMscf	5.88E-09	2.58E-08
Dichlorobenzene	Y	Y	1.20E-03	lb/MMscf	5.88E-06	2.58E-05
Fluoranthene	Y	N	3.00E-06	lb/MMscf	1.47E-08	6.44E-08
Fluorene	Y	N	2.80E-06	lb/MMscf	1.37E-08	6.01E-08
Formaldehyde	Y	Y	0.075	lb/MMscf	3.68E-04	1.61E-03
Hexane	Y	Y	1.80	lb/MMscf	8.82E-03	3.86E-02
Indeno(1,2,3-cd)pyrene	Y	N	1.80E-06	lb/MMscf	8.82E-09	3.86E-08
Lead and Lead compounds	Y	N	5.00E-04	lb/MMscf	2.45E-06	1.07E-05
Manganese & compounds	Y	Y	3.80E-04	lb/MMscf	1.86E-06	8.16E-06
Mercury	Y	Y	2.60E-04	lb/MMscf	1.27E-06	5.58E-06
Naphthalene	Y	N	6.10E-04	lb/MMscf	2.99E-06	1.31E-05
Nickel	Y	Y	2.10E-03	lb/MMscf	1.03E-05	4.51E-05
Phenanthrene	Y	N	1.70E-05	lb/MMscf	8.33E-08	3.65E-07
Pyrene	Y	N	5.00E-06	lb/MMscf	2.45E-08	1.07E-07
Selenium Compounds	Y	N	2.40E-05	lb/MMscf	1.18E-07	5.15E-07
Toluene	Y	Y	3.40E-03	lb/MMscf	1.67E-05	7.30E-05
				Total HAP Emissions:	**0.0093**	**0.041**
				Total TAP Emissions:	**0.025**	**0.11**

Notes:

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

Abbreviations:

CAS - chemical abstract service
CH_4 - methane
CO - carbon monoxide
CO2 - carbon dioxide
CO_2e - carbon dioxide equivalent
HAP - hazardous air pollutant
hr - hour
kg - kilogram
lb - pound
MMBtu - Million British thermal units
NO_x - nitrogen oxides
N_2O - nitrous oxide
ODT - oven dried short tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
TAP - toxic air pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

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

Table 5

Pellet Mill/Pellet Cooler, Dry Shavings Hammermill, and Dried Wood Day Silo Potential Emissions at Outlet of RTO/RCO Stack (CD-RCO)

Enviva Pellets Ahoskie, LLC

Calculation Basis

PM/PC Hourly Throughput	74.8 ODT/hr
PM/PC Annual Throughput	630,000 ODT/yr
DSHM Hourly Throughput	12 ODT/hr
DSHM Annual Throughput	100,000 ODT/yr
Hours of Operation	8,760 hr/yr
RTO/RCO Burner Rating	20 MMBtu/hr
RTO/RCO Control Efficiency	95.0 %

Total Potential Emissions at RTO/RCO Stack

Pollutant	Potential Emissions[1]	
	(lb/hr)	(tpy)
CO	5.32	22.4
NO_X	1.56	6.58
SO_2	0.012	0.051
VOC	8.92	37.5
Total PM	1.36	5.76
Total PM_{10}	1.36	5.76
Total $PM_{2.5}$	1.36	5.76
CO_2e	2,343	10,263
Total HAP	1.60	6.73
Total TAP	1.30	5.47

Notes:

1. Total emissions from the Pellet Mills, Pellet Coolers, Dry Shavings Hammermill and natural gas combustion by the RTO/RCO (injection gas and burner fuel). Detailed calculations are provided below.

Potential Criteria Pollutant and Greenhouse Gas Emissions - Pellet Mills and Pellet Coolers

Pollutant	Controlled Emission Factor	Units	Potential Emissions	
			(lb/hr)	(tpy)
CO	0.071	lb/ODT[1]	5.29	22.3
NO_X	0.021	lb/ODT[1]	1.53	6.46
SO_2	5.88E-04	lb/MMBtu[2]	0.012	0.051
Total VOC as Propane	0.11	lb/ODT[1]	8.08	34.0
$PM/PM_{10}/PM_{2.5}$ (Filterable + Condensable)	0.012	lb/ODT[1]	0.91	3.85
CO_2	118	lb/MMBtu[2]	2,329	10,203
CH_4	2.25E-03	lb/MMBtu[2]	0.045	0.20
N_2O	2.16E-03	lb/MMBtu[2]	0.043	0.19
CO_2e			2,343	10,263

Notes:

1. Emission factor based on process information and an appropriate contingency based on engineering judgement.
2. Emission factors from AP-42, Section 1.4 - Natural Gas Combustion, 07/98. Emission factors converted from lb/MMscf to lb/MMBtu based on assumed heating value of 1,020 Btu/scf for natural gas per AP-42 Section 1.4.

Table 5

Pellet Mill/Pellet Cooler, Dry Shavings Hammermill, and Dried Wood Day Silo Potential Emissions at Outlet of RTO/RCO Stack (CD-RCO)

Enviva Pellets Ahoskie, LLC

Potential HAP Emissions from Pellet Mills and Pellet Coolers

Pollutant	HAP	NC TAP	Controlled Emission Factor[1]	Potential Emissions	
			(lb/ODT)	(lb/hr)	(tpy)
Acetaldehyde	Y	Y	2.92E-03	0.22	0.92
Acrolein	Y	Y	3.84E-03	0.29	1.21
Formaldehyde	Y	Y	2.69E-03	0.20	0.85
Methanol	Y	N	3.72E-03	0.28	1.17
Phenol	Y	Y	6.06E-03	0.45	1.91
Propionaldehyde	Y	N	5.75E-04	0.043	0.18
			Total HAP Emissions	**1.48**	**6.24**
			Total TAP Emissions	**1.16**	**4.89**

Notes:

1. Emission factor based on process information and an appropriate contingency based on engineering judgement.

Potential PM, VOC, and HAP Emissions from Dry Shavings Hammermill

Pollutant	HAP	NC TAP	Controlled Emission Factor[1]	Potential Emissions	
			(lb/ODT)	(lb/hr)	(tpy)
Acetaldehyde	Y	Y	9.23E-04	0.011	0.046
Acrolein	Y	Y	6.56E-04	0.0079	0.033
Formaldehyde	Y	Y	1.56E-03	0.019	0.078
Methanol	Y	N	3.25E-03	0.039	0.16
Phenol	Y	Y	1.87E-05	2.24E-04	9.34E-04
Propionaldehyde	Y	N	2.86E-04	0.0034	0.014
			Total HAP Emissions	**0.080**	**0.33**
			Total TAP Emissions	**0.038**	**0.16**
Total VOC			0.070	0.84	3.50
$PM/PM_{10}/PM_{2.5}$ (Filterable + Condensable)			0.022	0.26	1.09

Notes:

1. Emission factor based on process information and an appropriate contingency based on engineering judgement.

Potential Particulate Emissions from Dried Wood Day Silo Bin Vent (CD-DWDS-BV)

Pollutant	Exhaust Flow Rate[1]	Exit Grain Loading[2,3]	Potential Emissions	
	(cfm)	(gr/cf)	(lb/hr)	(tpy)
PM (Filterable + Condensable)	2,186	0.01	0.187	0.82
PM_{10} (Filterable + Condensable)			0.187	0.82
$PM_{2.5}$ (Filterable + Condensable)			0.187	0.82

Notes:

1. Inlet flow rate (cfm) was obtained from previous permit application. The exit flowrate was conservatively assumed to be the same as the inlet flowrate.
2. Pollutant loading based on data from other Enviva facilities.
3. No speciation data is available for $PM_{10}/PM_{2.5}$. Therefore, it is conservatively assumed to be equal to total PM.

Thermally Generated Potential Criteria Pollutant Emissions from Combustion of VOC from Dry Shavings Hammermill

Maximum high heating value of VOC constituents	0.018 MMBtu/lb
Uncontrolled VOC emissions	17 lb/hr
Heat input of uncontrolled VOC emissions	0.31 MMBtu/hr
Uncontrolled VOC emissions	70 tons/yr
Heat input of uncontrolled VOC emissions	2,586 MMBtu/yr

Pollutant	Emission Factor[1]	Units	Potential Emissions	
			(lb/hr)	(tpy)
CO	0.082	lb/MMBtu	0.03	0.11
NO_x	0.10	lb/MMBtu	0.03	0.13

Table 5
Pellet Mill/Pellet Cooler, Dry Shavings Hammermill, and Dried Wood Day Silo Potential Emissions at Outlet of RTO/RCO Stack (CD-RCO)
Enviva Pellets Ahoskie, LLC

Potential HAP Emissions - RTO/RCO Burners

Pollutant	HAP	NC TAP	Emission Factor[1]	Units	Potential Emissions	
					(lb/hr)	(tpy)
RTO/RCO Burners - Natural Gas Combustion						
2-Methylnaphthalene	Y	N	2.40E-05	lb/MMscf	4.66E-07	2.04E-06
3-Methylchloranthrene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
7,12-Dimethylbenz(a)anthracene	Y	N	1.60E-05	lb/MMscf	3.11E-07	1.36E-06
Acenaphthene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
Acenaphthylene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
Ammonia	N	Y	3.2	lb/MMscf	6.21E-02	2.72E-01
Anthracene	Y	N	2.40E-06	lb/MMscf	4.66E-08	2.04E-07
Arsenic & Compounds	Y	Y	2.00E-04	lb/MMscf	3.88E-06	1.70E-05
Benz(a)anthracene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
Benzene	Y	Y	2.10E-03	lb/MMscf	4.08E-05	1.79E-04
Benzo(a)pyrene	Y	Y	1.20E-06	lb/MMscf	2.33E-08	1.02E-07
Benzo(b)fluoranthene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
Benzo(g,h,i)perylene	Y	N	1.20E-06	lb/MMscf	2.33E-08	1.02E-07
Benzo(k)fluoranthene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
Beryllium	Y	Y	1.20E-05	lb/MMscf	2.33E-07	1.02E-06
Cadmium	Y	Y	1.10E-03	lb/MMscf	2.14E-05	9.35E-05
Chromium VI	Y	N	1.40E-03	lb/MMscf	2.72E-05	1.19E-04
Chrysene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
Cobalt compounds	Y	N	8.40E-05	lb/MMscf	1.63E-06	7.14E-06
Dibenzo(a,h)anthracene	Y	N	1.20E-06	lb/MMscf	2.33E-08	1.02E-07
Dichlorobenzene	Y	Y	1.20E-03	lb/MMscf	2.33E-05	1.02E-04
Fluoranthene	Y	N	3.00E-06	lb/MMscf	5.82E-08	2.55E-07
Fluorene	Y	N	2.80E-06	lb/MMscf	5.44E-08	2.38E-07
Hexane	Y	Y	1.80	lb/MMscf	3.49E-02	1.53E-01
Indeno(1,2,3-cd)pyrene	Y	N	1.80E-06	lb/MMscf	3.49E-08	1.53E-07
Lead and Lead compounds	Y	N	5.00E-04	lb/MMscf	9.71E-06	4.25E-05
Manganese & compounds	Y	Y	3.80E-04	lb/MMscf	7.38E-06	3.23E-05
Mercury	Y	Y	2.60E-04	lb/MMscf	5.05E-06	2.21E-05
Naphthalene	Y	N	6.10E-04	lb/MMscf	1.18E-05	5.19E-05
Nickel	Y	Y	2.10E-03	lb/MMscf	4.08E-05	1.79E-04
Phenanthrene	Y	N	1.70E-05	lb/MMscf	3.30E-07	1.45E-06
Pyrene	Y	N	5.00E-06	lb/MMscf	9.71E-08	4.25E-07
Selenium Compounds	Y	N	2.40E-05	lb/MMscf	4.66E-07	2.04E-06
Toluene	Y	Y	3.40E-03	lb/MMscf	6.60E-05	2.89E-04
				Total HAP Emissions:	**0.035**	**0.15**
				Total TAP Emissions:	**0.10**	**0.43**

Notes:

[1] Emission factors for natural gas combustion are from NCDAQ Natural Gas Combustion Spreadsheet and AP-42, Fifth Edition, Volume 1, Chapter 1.4 - Natural Gas Combustion, 07/98. The emission factors for acrolein and ammonia are cited in the NCDAQ spreadsheet as being sourced from the USEPA's WebFIRE database. Formaldehyde and acetaldehyde are not included in this table because emissions of these pollutants resulting from RTO/RCO fuel combustion are already reflected in the controlled lb/ODT emission factors.

Abbreviations:

Btu - British thermal units
CH_4 - methane
CO - carbon monoxide
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
HAP - hazardous air pollutant
hr - hour
lb - pound
MMBtu - Million British thermal units
NO_x - nitrogen oxides
N_2O - nitrous oxide
ODT - oven dried short tons
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
RCO - regenerative catalytic oxidizer
RTO - regenerative thermal oxidizer
scf - standard cubic feet
SO_2 - sulfur dioxide
TAP - Toxic Air Pollutant
tpy - tons per year
VOC - volatile organic compound
yr - year

References:

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

Table 6
Potential Emissions from Bark Hog (IES-BARK)
Enviva Pellets Ahoskie, LLC

Calculation Basis

Annual Throughput	91,406	ODT/yr[1]
Hourly Throughput	10.4	ODT/hr[1]
Approximate Moisture Content	50%	

Pollutant	Emission Factor		Potential Emissions	
			Hourly (lb/hr)	Annual (tpy)
VOC as propane[2]	5.00E-03	lb/ODT	0.05	0.23
PM[3]	2.00E-02	lb/ton	0.42	1.83
PM_{10}[3]	1.10E-02	lb/ton	0.23	1.01
Methanol[4]	1.00E-03	lb/ODT	0.01	0.05

Notes:

[1] Annual throughput calculated based on 100% of the estimated Annual Dryer Heat Input, assuming 4,200 Btu/lb HHV (wet) and 50% Moisture. Maximum hourly throughput based on maximum fuel usage for the furnace.

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

[3] Particulate matter emission factors from the EPA document titled *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants*. Source Classification Code 3-07-008-01 (Log Debarking). All PM is assumed to be larger than 2.5 microns.

[4] Emission factor obtained from available emissions factors for chippers in AP-42 Section 10.6.3, Medium Density Fiberboard, 08/02, Table 7 and Section 10.6.4, Hardboard and Fiberboard, 10/02, Table 9.

References:

EPA. AP-42, Section 10.6.3, Medium Density Fiberboard, 08/02.

EPA. AP-42, Section 10.6.4, Hardboard and Fiberboard, 10/02.

EPA. AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants. March 1990.

Abbreviations:

hr - hour

lb - pound

ODT - oven dried short tons

tpy - tons per year

VOC - volatile organic compound

yr - year

Table 7
Potential Emissions from Dried Wood Handling (ES-DWH)
Enviva Pellets Ahoskie, LLC

Calculation Basis

Hourly Throughput[1]	63 ODT/hr
Annual Throughput[1]	550,000 ODT/yr

Potential VOC and HAP Pollutant Emissions

Pollutant	Emission Factor[2] (lb/ODT)	Potential Emissions	
		Hourly (lb/hr)	Annual (tpy)
Formaldehyde	3.20E-04	0.020	0.088
Propionaldehyde	1.18E-04	0.007	0.032
Methanol	6.84E-04	0.043	0.19
Acetaldehyde	4.03E-04	0.025	0.11
Total HAP Emissions		**0.10**	**0.42**
Total VOC (as propane)	0.053	3.30	14.4

Notes:

1. Hourly and annual throughputs assumed to be equal to the dryer throughput.
2. Emission factors based on process information and an appropriate contingency based on engineering judgement.

Abbreviations:

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

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

Emission Unit ID	Source Description	Control Device ID	Control Device Description	Exhaust Flow Rate[1]	Exit Grain Loading[2]	Annual Operation	Particulate Speciation		Potential Emissions					
									PM		PM_{10}		$PM_{2.5}$	
				(cfm)	(gr/cf)	(hours)	PM_{10} (% of PM)	$PM_{2.5}$ (% of PM)	Hourly (lb/hr)	Annual (tpy)	Hourly (lb/hr)	Annual (tpy)	Hourly (lb/hr)	Annual (tpy)
ES-PMFS	Pellet Mill Feed Silo	CD-PMFS-BV	One (1) baghouse[3]	2,186	0.01	8,760	100%	100%	0.19	0.82	0.19	0.82	0.19	0.82
ES-FB	Fines Bin	CD-FB-BV	One (1) baghouse[3]	3,600	0.01	8,760	100%	100%	0.31	1.35	0.31	1.35	0.31	1.35
ES-FPH; ES-TLB; ES-PL1 and PL2	Finished Product Handling; Twelve truck pellet loadout bins; Pellet load-out 1 and 2	CD-FPH-BF	One (1) baghouse[4,5]	35,500	0.01	8,760	91%	40%	3.04	13.3	2.77	12.1	1.22	5.33

Notes:

1. For esisting sources, filter, vent, and cyclone inlet flow rates (cfm) were obtained from previous permit application. The exit flowrate was conservatively assumed to be the same as the inlet flowrate.
2. Pollutant loading based on previous permit applications.
3. No speciation data is available for $PM_{10}/PM_{2.5}$. Therefore, it is conservatively assumed to be equal to total PM.
4. Finished product handling PM_{10} speciation based on AP-42 factors for wet wood combustion (Section 1.6) controlled by a mechanical separator. Since the particle size of particulate matter from a pellet cooler is anticipated to be larger than flyash, this factor is believed to be a conservative indicator of speciation.
5. Finished product handling $PM_{2.5}$ speciation based on review of NCASI data for similar baghouses in the wood products industry.

Abbreviations:

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

Table 9
Potential Emissions from Material Handling
Enviva Pellets Ahoskie, LLC

Source	Transfer Activity[1]	Control	Control Description	Number of Drop Points	Material Moisture Content	PM Emission Factor[1]	PM_{10} Emission Factor[1]	$PM_{2.5}$ Emission Factor[1]	Potential Throughput[2]		Potential PM Emissions		Potential PM_{10} Emissions		Potential $PM_{2.5}$ Emissions	
					(%)	(lb/ton)	(lb/ton)	(lb/ton)	(tph)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
ES-GWHS	Purchased Bark unloading via Truck Tipper	--	--	1	48%	3.74E-05	1.77E-05	2.68E-06	100	182,500	3.74E-03	3.41E-03	1.77E-03	1.61E-03	2.68E-04	2.44E-04
	Drop Points via FEL/Conveying from Bark Pile to Dryer Furnace	--	--	4	48%	3.74E-05	1.77E-05	2.68E-06	21	182,500	3.14E-03	1.36E-02	1.48E-03	6.45E-03	2.25E-04	9.77E-04
	Green Wood Chips unloading via Truck Tippers	--	--	4	48%	3.74E-05	1.77E-05	2.68E-06	440	1,100,000	6.58E-02	8.22E-02	3.11E-02	3.89E-02	4.71E-03	5.89E-03
	Drops Points via FEL/Conveying from Chip Pile to Dryer	--	--	8	48%	3.74E-05	1.77E-05	2.68E-06	150	1,100,000	4.48E-02	1.64E-01	2.12E-02	7.78E-02	3.21E-03	1.18E-02
ES-DWH	Dryer Discharge to Outfeed Conveyor	Enclosed	Reduction to 2 mph mean wind speed	1	10%	7.56E-05	3.58E-05	5.41E-06	70	632,500	5.27E-03	0.02	2.49E-03	1.13E-02	3.78E-04	1.71E-03
	Dryer Outfeed Conveyors to Silo Feed/Silo Bypass	Enclosed	Reduction to 2 mph mean wind speed	1	10%	7.56E-05	3.58E-05	5.41E-06	70	632,500	5.27E-03	0.024	2.49E-03	1.13E-02	3.78E-04	1.71E-03
	Conveyor to Hammermill Surge Bin drop into HM Surge Bin	Enclosed	Reduction to 2 mph mean wind speed	1	10%	7.56E-05	3.58E-05	5.41E-06	70	632,500	5.27E-03	0.024	2.49E-03	1.13E-02	3.78E-04	1.71E-03
IES-ADD	Additive Handling and Storage	--	--	1	10%	3.36E-04	1.59E-04	2.41E-05	25	1,575	8.40E-03	2.65E-04	3.97E-03	1.25E-04	6.02E-04	1.89E-05
IES-DRYSHAVE	Dry Shavings unloading via Truck Tipper	--	--	1	14%	2.10E-04	9.92E-05	1.50E-05	50	116,279	1.05E-02	1.22E-02	4.96E-03	5.77E-03	7.51E-04	8.73E-04
	Dry Shavings Drop from Storage to Conveyor	--	--	1	14%	2.10E-04	9.92E-05	1.50E-05	20	116,279	4.20E-03	1.22E-02	1.98E-03	5.77E-03	3.00E-04	8.73E-04
										Total Emissions:	**0.16**	**0.36**	**0.074**	**0.17**	**0.011**	**0.026**

Notes:

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

$$E = k(0.0032) \times \frac{(\frac{U}{5})^{1.3}}{(\frac{M}{2})^{1.4}}$$

where:

E	= emission factor (lb/ton)	
k	= particle size multiplier (dimensionless) for PM	0.74
k	= particle size multiplier (dimensionless) for PM_{10}	0.35
k	= particle size multiplier (dimensionless) for $PM_{2.5}$	0.053
U	= mean wind speed (mph)	6.3
U	= mean wind speed (mph) for enclosed drops	2
M	= material moisture content (%)	

2. Throughputs represent green weight of materials, calculated based on listed material moisture contents.

References:

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

Abbreviations:

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

Table 10
Potential Emissions from Storage Pile Wind Erosion (ES-GWHS)
Enviva Pellets Ahoskie, LLC

Source	Description	PM Emission Factor[1]		VOC Emission Factor[2]		Pile Width	Pile Length	Pile Height	Exposed Surface Area of Pile[3]	Potential PM Emissions		Potential PM_{10} Emissions		Potential $PM_{2.5}$ Emissions		Potential VOC Emissions (as propane)[4]	
		(lb/day /acre)	($lb/hr/ft^2$)	(lb/day /acre)	($lb/hr/ft^2$)	(ft)	(ft)	(ft)	(ft^2)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
ES GWHS	Green Wood Chip Storage Pile 1	0.01	6.9E-09	3.60	3.4E-06	300	350	20	157,200	1.09E-03	4.78E-03	5.46E-04	2.39E-03	8.18E-05	3.58E-04	0.66	2.89
	Green Wood Chip Storage Pile 2	0.01	6.9E-09	3.60	3.4E-06	200	400	20	124,800	8.66E-04	3.79E-03	4.33E-04	1.90E-03	6.50E-05	2.85E-04	0.52	2.30
	Bark Storage Pile	0.01	6.9E-09	3.60	3.4E-06	150	40	20	16,320	1.13E-04	4.96E-04	5.66E-05	2.48E-04	8.50E-06	3.72E-05	0.069	0.30
	Mixing Storage Pile	0.01	6.9E-09	3.60	3.4E-06	200	150	20	38,446	2.67E-04	1.17E-03	1.33E-04	5.84E-04	2.00E-05	8.77E-05	0.16	0.71
									Total Emissions:	**2.34E-03**	**1.02E-02**	**1.17E-03**	**5.12E-03**	**1.75E-04**	**7.68E-04**	**1.41**	**6.20**

Notes:

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

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

where:		
s, silt content of wood chips (%):	0.0094	s - silt content (%) for bark based on NCASI Special Report 15-01 with appropriate contingency based on engineering judgement.
p, number of days with rainfall greater than 0.01 inch:	120	Based on AP-42, Section 13.2.2 - Unpaved Roads, 11/06, Figure 13.2.1-2.
f (time that wind exceeds 5.36 m/s - 12 mph) (%):	9.8	Based on meteorological data averaged for 2007-2011 for Northampton, NC.
PM_{10}/TSP ratio:	50%	PM_{10} is assumed to equal 50% of TSP based on U.S. EPA Control of Open Fugitive Dust Sources, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.
$PM_{2.5}$/TSP ratio:	7.5%	$PM_{2.5}$ is assumed to equal 7.5 % of TSP U.S. EPA Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors. November 2006.

2. VOC emission factor obtained from NCASI Technical Bulletin No. 700, *A Preliminary Investigation of Releases of Volatile Organic Compounds from Wood Residual Storage Piles* for the calculation of fugitive VOC emissions from Douglas Fir wood storage piles. Emission factors ranged from 1.6 to 3.6 lb C/acre-day. The maximum emission factor has conservatively been selected.

3. The surface area for rectangular piles is calculated as [2*H*L+2*W*H+L*W] + 20% to consider the sloping pile edges.

4. Emission factor converted from as carbon to as propane by multiplying by 1.22.

Abbreviations:

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

References:

EPA. AP-42, Section 13.2.2 - Unpaved Roads, 11/06.
U.S. EPA. Control of Open Fugitive Dust Sources, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.
U.S. EPA. Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors. November 2006.
NCASI. Technical Bulletin No. 700, Preliminary Investigation of Releases of Volatile Organic Compounds from Wood Residual Storage Piles. October 1995.
NCASI. Special Report No. 15-01: Estimating the Potential for PM2.5 Emissions from Wood and Bark Handling. Revised April 2015.

Table 11
Potential Emissions from Emergency Generator (IES-EG) and Fire Water Pump (IES-FWP)
Enviva Pellets Ahoskie, LLC

Emergency Generator - Emissions (IES-EG)

Equipment and Fuel Characteristics

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

Criteria Pollutant and Greenhouse Gas Emissions

Pollutant	Emission Factor	Units	Potential Emissions	
			Hourly (lb/hr)	Annual (tpy)
TSP	0.20	g/kW-hr (2)	0.12	0.029
PM_{10}	0.20	g/kW-hr (2)	0.12	0.029
$PM_{2.5}$	0.20	g/kW-hr (2)	0.12	0.029
NO_x	4.00	g/kW-hr (5)	2.30	0.58
SO_2	15	ppmw (3)	3.81E-03	9.52E-04
CO	3.50	g/kW-hr (2)	2.01	0.50
VOC (NMHC)	2.47E-03	lb/hp-hr (4)	0.86	0.22
CO_2	1.15	lb/hp-hr (4)	402.50	100.63

Hazardous Air Pollutant Emissions

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

Notes:

[1] NSPS Subpart IIII allows for only 100 hr/yr of non-emergency operation of this engine. The potential annual emissions for the emergency generator are conservatively based on 500 hr/yr. Emergency operation is not limited.

[2] Emissions standards from NSPS Subpart IIII for emergency engines with a maximum power rating greater than 50 horsepower [§60.4202(a)(2)].

[3] Sulfur content in accordance with 40 CFR 1090.305 as required by NSPS Subpart IIII [§60.4207(b)].

[4] Emission factor obtained from AP-42 Section 3.3, Tables 3.3-1 Table 3.3-2. Emission factors were converted from lb/MMBtu to lb/hp-hr using a brake-specific fuel consumption of 7,000 Btu/hp-hr per AP-42 Section 3.3.

[5] Emission standard for NOx+NMHC (Non-Methane Hydrocarbons) from NSPS Subpart IIII is used to calculate emissions of NO_x. Conservatively assumed entire limit is attributable to NO_x.

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

Table 11
Potential Emissions from Emergency Generator (IES-EG) and Fire Water Pump (IES-FWP)
Enviva Pellets Ahoskie, LLC

Firewater Pump Emissions (IES-FWP)

Equipment and Fuel Characteristics

Engine Output	0.17 MW
Engine Power	234 hp
Hours of Operation	500 hr/yr[1]
Heating Value of Diesel	19,300 Btu/lb
Power Conversion	7,000 Btu/hr/hp

Criteria Pollutant and Greenhouse Gas Emissions

Pollutant	Emission Factor	Units	Potential Emissions	
			Hourly (lb/hr)	Annual (tpy)
TSP	3.31E-04	lb/hp-hr (2)	0.077	0.019
PM_{10}	3.31E-04	lb/hp-hr (2)	0.077	0.019
$PM_{2.5}$	3.31E-04	lb/hp-hr (2)	0.077	0.019
NO_x	6.28E-03	lb/hp-hr (2)(3)	1.47	0.37
SO_2	15	ppmw (4)	2.55E-03	6.37E-04
CO	5.73E-03	lb/hp-hr (2)	1.34	0.34
VOC (NMHC)	3.54E-04	lb/hp-hr (2)	0.083	0.021
CO_2	1.15	lb/hp-hr (5)	269	67.28

Hazardous Air Pollutant Emissions

Pollutant	Emission Factor	Units	Potential Emissions	
			Hourly (lb/hr)	Annual (tpy)
Acetaldehyde	5.37E-06	lb/hp-hr (5)	1.26E-03	3.14E-04
Acrolein	6.48E-07	lb/hp-hr (5)	1.52E-04	3.79E-05
Benzene	6.53E-06	lb/hp-hr (5)	1.53E-03	3.82E-04
Benzo(a)pyrene	1.32E-09	lb/hp-hr (5)(6)	3.08E-07	7.70E-08
1,3-Butadiene	2.74E-07	lb/hp-hr (5)	6.40E-05	1.60E-05
Formaldehyde	8.26E-06	lb/hp-hr (5)	1.93E-03	4.83E-04
Polycyclic Organic Matter	1.18E-06	lb/hp-hr (5)	2.75E-04	6.88E-05
Toluene	2.86E-06	lb/hp-hr (5)	6.70E-04	1.67E-04
Xylene	2.00E-06	lb/hp-hr (5)	4.67E-04	1.17E-04
		Total HAP:	**6.34E-03**	**1.59E-03**

Notes:

[1] NESHAP Subpart ZZZZ allows for only 100 hr/yr of non-emergency operation of this engine. The potential annual emissions for the fire water pump are conservatively based on 500 hr/yr. Emergency operation is not limited.

[2] Based on applicable emission standard per Table 4 of NSPS Subpart IIII [§60.4205(c)].

[3] Subpart IIII specifies a combined standard for NMHC+NO_x. Based on guidance from the California Air Resource Board (CARB), 95% is assumed to be NO_x and 5% NMHC. Per the EPA NONROAD model, a VOC to NMHC ratio of 1.07 was assumed.

[4] Sulfur content in accordance with 40 CFR 1090.305 as required by NSPS Subpart IIII [§60.4207(b)].

[5] Emission factor obtained from AP-42 Section 3.3, Tables 3.3-1 Table 3.3-2. HAP emission factors were converted from lb/MMBtu to lb/hp-hr using a brake-specific fuel consumption of 7,000 Btu/hp-hr per AP-42 Section 3.3.

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

References:

EPA. AP-42, Section 3.3 - Gasoline and Diesel Industrial Engines, 10/96.

Table 12
Diesel Storage Tanks
IES-TK-1 through IES-TK-4
Enviva Pellets Ahoskie, LLC

Calculation Constants

Description	IES-TK-1	IES-TK-2	IES-TK-3	IES-TK-4	Units	Notes
α - Tank Paint Solar Absorptance	0.25				dimensionless	AP-42, Chapter 7 - Table 7.1-6 for White Tank, Average Condition
I - Annual Avg Total Solar Insolation Factor	1,349				dimensionless	AP-42, Chapter 7 - Table 7.1-7 for Norfolk, VA
T_{AX} - Annual Avg Maximum Ambient Temperature	528				R	AP-42, Chapter 7 - Table 7.1-7 for Norfolk, VA
T_{AN} - Annual Avg Minimum Ambient Temperature	513				R	AP-42, Chapter 7 - Table 7.1-7 for Norfolk, VA
R - Ideal Gas Constant	10.731				psia*ft^3/lb-mole R	AP-42, Chapter 7 - Page 7.1-23
Kp - Product Factor	1				dimensionless	Assume conservative value of 1
P_{VX} - Vapor Pressure at T_{AX}	0.0085				psia	AP-42, Chapter 7 - Equation 1-25 (exp[A-(B/T_{LA})])
P_{VN} - Vapor Pressure at T_{AN}	0.0051				psia	AP-42, Chapter 7 - Equation 1-25 (exp[A-(B/T_{LA})])
ΔP_V - Daily Vapor Pressure Range	0.0034				psia	AP-42, Chapter 7 - Equation 1-9
ΔP_B - Breather Vent Pressure Setting Range	0.06				psia	AP-42, Chapter 7 - Page 7.1-19 Note 3 (default)
P_A - Atmospheric Pressure	14.68				psia	AP-42, Chapter 7 - Table 7.1-7 for Norfolk, VA

Calculation Inputs

Description	IES-TK-1	IES-TK-2	IES-TK-3	IES-TK-4	Units	Notes
Tank Diameter	6.0	3.0	4.0	4.0	ft	Tank dimensions for corresponding design volume
Tank Length	12.0	10.0	6.5	10.5	ft	Tank dimensions for corresponding design volume
Tank Design Volume	2,500	500	600	1,000	gal	Conservative design specifications
Tank Working Volume	1,250	250	300	500	gal	50% of tank design volume because tanks will not be full at all times
Tank Throughput	8,813	7,554	100,000	150,000	gal/yr	Engineering estimate
Equivalent Tank Diameter (D_E)	9.6	6.2	5.8	7.3	ft	AP-42, Chapter 7 - Equation 1-14 (SQRT(LD/(PI/4)))
Effective Height (H_E)	4.7	2.4	3.1	3.1	ft	AP-42, Chapter 7 - Equation 1-15 (PI/4*D)
V_V - Vapor Space Volume	169.6	35.3	40.8	66.0	ft^3	AP-42, Chapter 7 - Equation 1-3 (PI/4*D^2*H_{VO}), substitute D_E for D for horizontal tanks
H_{VO} - Vapor Space Outage	2.4	1.2	1.6	1.6	ft	AP-42, Chapter 7 - H_{VO} = 0.5*H_E for horizontal tanks
P_{VA} - Vapor Pressure	0.009	0.009	0.009	0.009	psia	Vapor pressure for Distillate Fuel Oil No. 2 at 70°F
M_V - Vapor Molecular Weight	130	130	130	130	lb/lb-mole	AP-42, Chapter 7 - Table 7.1-2 for diesel
Q - Throughput	209.8	179.9	2,381.0	3,571.4	bbl/yr	

Calculated Values

Description	IES-TK-1	IES-TK-2	IES-TK-3	IES-TK-4	Units	Notes
K_E - Vapor Space Expansion Factor	0.030	0.030	0.030	0.030	dimensionless	AP-42, Chapter 7 - Equation 1-5 ($\Delta T_V/T_{LA}$ + ((ΔP_V - ΔP_B)/(P_A - ΔP_{VA}))
ΔT_V - Daily Vapor Temperature Range	17.46	17.46	17.46	17.46	R	AP-42, Chapter 7 - Equation 1-7 (0.7*ΔT_A + 0.02*α*I)
ΔT_A - Daily Ambient Temperature Range	15.3	15.3	15.3	15.3	R	AP-42, Chapter 7 - Equation 1-11 (T_{AX} - T_{AN})
K_S - Vented Vapor Saturation Factor	1.00	1.00	1.00	1.00	dimensionless	AP-42, Chapter 7 - Equation 1-21 (1/(1 + 0.053P_{VA}*H_{VO}))
W_V - Stock Vapor Density	0.00021	0.00021	0.00021	0.00021	lb/ft^3	AP-42, Chapter 7 - Equation 1-22 (Mv * P_{VA}) / (R * T_V)
T_V - Average Vapor Temperature	523.7	523.7	523.7	523.7	R	AP-42, Chapter 7 - Equation 1-33 (0.7*T_{AA} + 0.3T_B + 0.009α*I)
T_{AA} - Daily Average Ambient Temperature	520.4	520.4	520.4	520.4	R	AP-42, Chapter 7 - Equation 1-30 ((T_{AX} + T_{AN})/2)
T_B - Liquid Bulk Temperature	521.4	521.4	521.4	521.4	R	AP-42, Chapter 7 - Equation 1-31 (T_{AA} + 0.003aI)
T_{LA} - Daily Average Liquid Surface Temperature	522.6	522.6	522.6	522.6	R	AP-42, Chapter 7 - Equation 1-28 (0.4*T_{AA} + 0.6T_B + 0.005*α*I)
N - Number of Turnovers	7.1	30.2	333.3	300.0	dimensionless	
K_N - Working Loss Turnover (Saturation) Factor	1	1.00	0.26	0.27	dimensionless	AP-42, Chapter 7 - Page 7.1-28 (For N>36, K_N = (180 + N)/6N; For N≤36, K_N = 1)
V_Q - Net Working Loss Throughput	1,178	1,010	13,367	20,050	ft^3/yr	AP-42 Chapter 7 - Equation 1-39 (5.614*Q)
K_P - Working Loss Product Factor	1	1	1	1	dimensionless	AP-42 Chapter 7 - Page 7.1-28
K_B - Vent Setting Correction Factor	1	1	1	1	dimensionless	AP-42 Chapter 7 - Page 7.1-28

Potential VOC Emissions

Description	IES-TK-1	IES-TK-2	IES-TK-3	IES-TK-4	Units	Notes
L_S - Standing Loss	0.38	0.079	0.092	0.15	lbs/yr	AP-42, Chapter 7 - Equation 1-2 (365 * Vv * Wv * Ke * Ks)
L_W - Working Loss	0.25	0.21	0.71	1.11	lbs/yr	AP-42, Chapter 7 - Equation 1-35 (V_Q * K_N * K_P * W_V * K_B)
L_T - Total Loss	0.63	0.29	0.81	1.26	lbs/yr	AP-42, Chapter 7 - Equation 1-1 (Ls + Lw)
Contingency Factor	1.00	1.00	1.00	1.00	dimensionless	Assumed contingency factor to account for unaccounted variables.
Total VOC Emissions per Tank	0.63	0.29	0.81	1.26	lbs/yr	
Total VOC Emissions	**3.13E-04**	**1.45E-04**	**4.03E-04**	**6.31E-04**	**tons/yr**	

Reference:

U.S. AP-42, Section 7.1 - Organic Liquid Storage Tanks, 07/2020

Table 13a

Potential Fugitive PM Emissions from Paved Roads

Enviva Pellets Ahoskie, LLC

Vehicle Activity	Distance Traveled per Roundtrip[1] (ft)	Trips Per Day[2]	Daily VMT	Events Per Year (days)	Empty Truck Weight (lb)	Loaded Truck Weight (lb)	Average Truck Weight (ton)	Annual VMT	PM Emission Factor[3] (lb/VMT)	PM_{10} Emission Factor[3] (lb/VMT)	$PM_{2.5}$ Emission Factor[3] (lb/VMT)	Potential PM Emissions (lb/day)	Potential PM Emissions (tpy)	Potential PM_{10} Emissions (lb/day)	Potential PM_{10} Emissions (tpy)	Potential $PM_{2.5}$ Emissions (lb/day)	Potential $PM_{2.5}$ Emissions (tpy)
Chip Delivery to Truck Tippers 1, 2, and 3	2,260	101	43	365	40,480	92,480	33.2	15,779	1.16	0.23	0.06	5.03	0.92	1.01	0.18	0.25	0.045
Chip Delivery to Truck Tipper No. 4	1,850	101	35	365	40,480	92,480	33.2	12,917	1.16	0.23	0.06	4.12	0.75	0.82	0.15	0.20	0.037
Dry Shavings Delivery to Truck Dump	2,115	12	5	365	40,480	65,000	26.4	1,754	0.92	0.18	0.05	0.44	0.081	0.088	0.016	0.022	0.0040
Bark Fuel Delivery to Fuel Truck Dump	1,740	26	9	365	40,960	92,960	33.5	3,127	1.17	0.23	0.06	1.00	0.18	0.20	0.037	0.049	0.0090
Pellet Truck to Pellet Loadout Area (Normal Operations)	2,080	59	23	365	40,480	102,480	35.7	8,483	1.25	0.25	0.06	2.91	0.53	0.58	0.11	0.14	0.026
CNG Fuel Delivery	1,660	4	1	365	40,480	58,480	24.7	459	0.86	0.172	0.042	0.11	0.020	0.022	0.0040	0.0053	0.0010
Employee Car Parking	2,250	75	32	365	4,000	4,000	2.0	11,665	0.07	0.013	0.0032	0.21	0.039	0.042	0.008	0.010	0.0019
											Total Emissions:	**13.8**	**2.52**	**2.76**	**0.50**	**0.68**	**0.12**

Notes:

1. Distance traveled per round trip was provided by Enviva.
2. Daily trip counts based on original permit application estimation.
3. Emission factors calculated based on Equation 2 from AP-42 Section 13.2.1 - Paved Roads, 01/11.

Particulate Emission Factor: $E = k(sL)^{0.91} \times (W)^{1.02} * (1-P/4N)$

where:

E = emission factor (lb/ton)

k = particle size multiplier (dimensionless) for PM 0.011

k = particle size multiplier (dimensionless) for PM_{10} 0.0022

k = particle size multiplier (dimensionless) for $PM_{2.5}$ 0.00054

sL - mean road surface silt loading based on sampling data from a wood pellet manufacturing plant (g/m^2) 3.6

P - No. days with rainfall greater than 0.01 inch 120 Per AP-42, Section 13.2.1, Figure 13.2.1-2

N = number of days in the averaging period

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

References:

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

Air Pollution Engineering Manual, Air and Waste Management Association.

Abbreviations:

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

Table 13b
Potential Fugitive PM Emissions from Unpaved Roads
Enviva Pellets Ahoskie, LLC

Vehicle Activity	Distance Traveled per Roundtrip[1] (ft)	Trips Per Day[1]	Daily VMT	Events Per Year (days)	Empty Truck Weight (lb)	Loaded Truck Weight (lb)	Average Truck Weight (ton)	Annual VMT	Silt Content (s)[2] (%)	PM Emission Factor[3] (lb/VMT)	PM_{10} Emission Factor[3] (lb/VMT)	$PM_{2.5}$ Emission Factor[3] (lb/VMT)	Potential PM Emissions[4] (tpy)	Potential PM_{10} Emissions[4] (tpy)	Potential $PM_{2.5}$ Emissions[4] (tpy)
Pellet Truck Delivery to Pellet Loadout Area	940	59	11	365	40,480	102,480	35.7	3,834	1.80	2.66	0.56	0.056	5.10	1.07	0.11
Chip Delivery to Truck Tipper No. 4	1,224	101	23	365	40,480	92,480	33.2	8,546	1.80	2.57	0.54	0.054	11.0	2.30	0.23
Dry Shavings Delivery to Truck Dump	940	12	2	365	40,480	65,000	26.4	780	1.80	2.32	0.49	0.049	0.90	0.19	0.019
Bark Fuel Delivery to Fuel Truck Dump	320	26	2	365	40,960	92,960	33.5	575	1.80	2.58	0.54	0.054	0.74	0.16	0.016
CNG Fuel Delivery	490	4	0.4	365	40,480	58,480	24.74	135	1.80	2.25	0.47	0.047	0.15	0.032	0.0032
Front End Loaders Transferring Softwood Chips	1,035	915	179	--	56,375	67,903	31.1	37,406	0.0094	0.063	0.0046	4.62E-04	1.18	0.086	0.0086
Front End Loaders Transferring Hardwood Chips	633	915	110	--	56,375	67,903	31.1	22,868	0.0094	0.063	0.0046	4.62E-04	0.72	0.053	0.0053
Front End Loaders Transferring Mixed Chips	380	915	66	--	56,375	67,903	31.1	13,735	0.0094	0.063	0.0046	4.62E-04	0.43	0.032	0.0032
Front End Loaders Transferring Dry Shavings	500	640	61	--	56,375	60,125	29.1	5,873	0.0094	0.061	0.0045	4.48E-04	0.18	0.013	0.0013
Front End Loaders Transferring Bark	2,229	500	211	--	56,375	65,975	30.6	16,052	0.0094	0.063	0.0046	4.58E-04	0.50	0.037	0.0037
							247	**109,803**	--	--	--	--	**20.9**	**3.97**	**0.40**

Emission Calculations Unpaved Roads:

Pollutant	Empirical Constant (k)[5]	Particle Constant a[5]	Particle Constant b[5]
	(lb/VMT)	(-)	(-)
PM	4.9	0.7	0.45
PM_{10}	1.5	0.9	0.45
$PM_{2.5}$	0.15	0.9	0.45

Notes:

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

[2] Silt loading factor based on NCASI data and sampling data from a pellet manufacturing plant.

[3] Emission factors calculated based on Equation 1a from AP-42 Section 13.2.2 - Unpaved Roads, 11/06.

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

k = particle size multiplier for particle size range and units of interest

E = size-specific emission factor (lb/VMT)

s = surface material silt content (%)

W = mean vehicle weight (tons)

P = number of days with at least 0.01 in of precipitation during the averaging period =

= 120 Per AP-42, Section 13.2.1, Figure 13.2.2-1

[4] Potential emissions calculated from appropriate emission factor times vehicle miles traveled.

[5] Constants (k, a, & b) based on AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-2 for Industrial Roads, 11/06

References:

EPA. AP-42, Section 13.2.2 - Unpaved Roads, 11/06.
NCASI. Special Report No. 15-01: Estimating the Potential for PM2.5 Emissions from Wood and Bark Handling. Revised April 2015.

Abbreviations:

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

Table 14

Potential Emissions from Natural Gas Boilers (IES-BOIL-1 and IES-BOIL-2)

Enviva Pellets Ahoskie, LLC

Calculation Basis

Maximum Heat Input	9.9 MMBtu/hr
Fuel Usage[1]	9.71E-03 MMscf/hr
	85.0 MMscf/yr
Hours of Operation	8,760 hr/yr
Number of boilers	2

Notes:

1. Hourly fuel usage (per boiler) calculated based on maximum heat input and heating value of 1,020 btu/scf for natural gas obtained from AP-42 Section 1.4 Natural Gas Combustion, 7/98.

Potential Criteria Pollutant Emissions

Pollutant	Emission Factor[1]	Units	Potential Emissions per Boiler	
			(lb/hr)	(tpy)
CO	84.0	lb/MMscf	0.82	3.57
NO_X	50.0	lb/MMscf	0.49	2.13
SO_2	0.60	lb/MMscf	0.0058	0.026
VOC	5.50	lb/MMscf	0.053	0.23
PM	7.60	lb/MMscf	0.074	0.32
PM_{10}	7.60	lb/MMscf	0.074	0.32
$PM_{2.5}$	7.60	lb/MMscf	0.074	0.32
CO_2	120,000	lb/MMscf	1,165	5,101
CH_4	2.30	lb/MMscf	0.022	0.098
N_2O	0.64	lb/MMscf	0.0062	0.027
CO_2e^2			1,167	5,112

Notes:

1. Emission factors from AP-42 Chapter 1.4 Natural Gas Combustion, 7/98.
2. CO_2e emissions based on global warming potentials from Table A-1 of Subpart A of 40 CFR Part 98.

Table 14
Potential Emissions from Natural Gas Boilers (IES-BOIL-1 and IES-BOIL-2)
Enviva Pellets Ahoskie, LLC

Potential HAP and TAP Emissions

Pollutant	HAP	NC TAP	Emission Factor[1] (lb/MMscf)	Potential Emissions per Boiler (lb/hr)	Potential Emissions per Boiler (tpy)
2-Methylnaphthalene	Y	N	2.40E-05	2.33E-07	1.02E-06
3-Methylchloranthrene	Y	N	1.80E-06	1.75E-08	7.65E-08
7,12-Dimethylbenz(a)anthracene	Y	N	1.60E-05	1.55E-07	6.80E-07
Acenaphthene	Y	N	1.80E-06	1.75E-08	7.65E-08
Acenaphthylene	Y	N	1.80E-06	1.75E-08	7.65E-08
Acetaldehyde	Y	Y	1.52E-05	1.48E-07	6.46E-07
Acrolein	Y	Y	1.80E-05	1.75E-07	7.65E-07
Ammonia	N	Y	3.20E+00	3.11E-02	1.36E-01
Anthracene	Y	N	2.40E-06	2.33E-08	1.02E-07
Arsenic and compounds	Y	Y	2.00E-04	1.94E-06	8.50E-06
Benz(a)anthracene	Y	N	1.80E-06	1.75E-08	7.65E-08
Benzene	Y	Y	2.10E-03	2.04E-05	8.93E-05
Benzo(a)pyrene	Y	Y	1.20E-06	1.16E-08	5.10E-08
Benzo(b)fluoranthene	Y	N	1.80E-06	1.75E-08	7.65E-08
Benzo(g,h,i)perylene	Y	N	1.20E-06	1.16E-08	5.10E-08
Benzo(k)fluoranthene	Y	N	1.80E-06	1.75E-08	7.65E-08
Beryllium metal	Y	Y	1.20E-05	1.16E-07	5.10E-07
Cadmium Metal	Y	Y	1.10E-03	1.07E-05	4.68E-05
Chromium--Other compounds	Y	N	1.40E-03	1.36E-05	5.95E-05
Chrysene	Y	N	1.80E-06	1.75E-08	7.65E-08
Cobalt compounds	Y	N	8.40E-05	8.15E-07	3.57E-06
Dibenzo(a,h)anthracene	Y	N	1.20E-06	1.16E-08	5.10E-08
Dichlorobenzene	Y	Y	1.20E-03	1.16E-05	5.10E-05
Fluoranthene	Y	N	3.00E-06	2.91E-08	1.28E-07
Fluorene	Y	N	2.80E-06	2.72E-08	1.19E-07
Formaldehyde	Y	Y	0.075	7.28E-04	0.0032
Hexane	Y	Y	1.80	0.017	0.077
Indeno(1,2,3-cd)pyrene	Y	N	1.80E-06	1.75E-08	7.65E-08
Lead and lead compounds	Y	N	5.00E-04	4.85E-06	2.13E-05
Manganese and compounds	Y	Y	3.80E-04	3.69E-06	1.62E-05
Mercury	Y	Y	2.60E-04	2.52E-06	1.11E-05
Naphthalene	Y	N	6.10E-04	5.92E-06	2.59E-05
Nickel metal	Y	Y	2.10E-03	2.04E-05	8.93E-05
Phenanthrene	Y	N	1.70E-05	1.65E-07	7.23E-07
Pyrene	Y	N	5.00E-06	4.85E-08	2.13E-07
Selenium compounds	Y	N	2.40E-05	2.33E-07	1.02E-06
Toluene	Y	Y	3.40E-03	3.30E-05	1.45E-04
			Total HAP Emissions:	**0.018**	**0.080**
			Total TAP Emissions:	**0.049**	**0.22**

Notes:

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

Abbreviations:

CH_4 - methane
CO - carbon monoxide
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
g - gram
HAP - hazardous air pollutant
hp - horsepower
hr - hour
lb - pound
MMBtu - Million British thermal units
MMscf - Million standard cubic feet
NO_x - nitrogen oxides
N_2O - nitrous oxide
PM - particulate matter
PM_{10} - particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_2 - sulfur dioxide
tpy - tons per year
VOC - volatile organic compound
yr - year

Reference:

AP-42, Section 1.4 - Natural Gas Combustion, 7/98.

RAMBOLL

ENVIRONMENT
& HEALTH

Via Electronic Mail

Mr. Mark Cuilla
Chief, Permitting Section
North Carolina Department of Environmental Quality, Division of Air Quality
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RE: ENVIVA PELLETS AHOSKIE, LLC – AHOSKIE, NC
APPLICATION FOR RENEWAL AND MODIFICATION OF TITLE V PERMIT
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Dear Mr. Cuilla,

December 22, 2021

Ramboll US Consulting, Inc. (Ramboll), on behalf of Enviva Pellets Ahoskie, LLC (Enviva) located in Hertford County (Facility ID #4600107), is submitting this letter and the attached information in response to the North Carolina Division of Air Quality's (DAQ's) request for additional information dated September 30, 2021. As requested by Richard Simpson (DAQ) on November 27, 2021, Enviva is providing a complete replacement Title V Renewal and Modification Application. This submittal includes several proposed changes to the Ahoskie plant in addition to those changes proposed in the application submitted on August 28, 2020 and the Addendum submitted on December 15, 2020.[1] Details describing the proposed new changes requested in the replacement permit application are provided below following Enviva's responses to DAQ's specific requests for additional information.

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The following sets forth each item requested by DAQ in italics, followed by Enviva's response.

1. *40 CFR Part 64, CAM, allows 180 days after a signed permit for applicants to provide indicators for new sources and control devices. The modifications associated with this application are expected to take longer than 180 days to complete. Therefore, DAQ will require CAM plans for applicable existing sources/control devices (pre modification) that will be applicable upon signature of the permit. DAQ will also require separate*

[1] Telephone conversation between Richard Simpson (DAQ) and Michael Carbon (Ramboll) on November 27, 2021.

CAM plans for modified/new sources and control devices (post modification) that will each have a schedule for compliance based upon a source(s)'/control device(s)' start date.

DAQ is correct that the proposed new sources and control devices will not be installed and operational within 180 days of final permit issuance. Therefore, CAM applicability for pre-modification operations was assessed based on the current equipment/control device configuration and hourly/annual throughputs consistent with the current permit basis (10121T04). Attachment 1 documents the CAM applicability analyses for pre-modification operations and CAM plans to address pre-modification operations are included as part of the revised permit application in Attachment 2.

As shown in Attachment 1, CAM applies to the Pellet Mills and Coolers (ES-CLR1 through 5), Fines Bin (ES-FB), Finished Product Handling (ES-FPH), Truck Loadout Bin (ES-TLB), and two Pellet Loadouts (ES-PL1 and 2). Each of these sources is subject to a particulate matter (PM) emission limit under 15A NCAC 02D .0515, utilizes a control device to achieve compliance with this limit, and has pre-controlled potential PM emissions greater than 100 tons per year (tpy). All other sources either do not have potential pre-controlled emissions greater than 100 tpy, or do not require a control device to comply with the applicable PM limit under 15A NCAC 02D .0515 (i.e., uncontrolled PM emissions are less than the process weight limit).

2. *As part of those CAM plans, Enviva proposes both primary and secondary monitoring indicators on the more complex control device systems. One of your proposed monitoring indicators was a weekly visible emissions observation. Per 40 CFR 64.3(b)(4)(iii), for emission units with potential to emit less than the major source threshold after control, the minimum frequency for data collection is once per 24-hour period (daily). As an alternative, we are requesting the facility to provide the appropriate pressure drop range for the applicable control devices. The pressure drop range will be used as a primary indicator along with the associated performance criteria. The frequency for all pressure drop ranges must be daily. The secondary indicator can remain as weekly visible emissions observations as proposed in the application. The Quality Improvement Plan (QIP) threshold will be five (5) excursions per reporting period.*

Each of the CAM plans submitted as part of the August 2020 application include monitoring for at least one parameter on a daily (if not more frequent) basis which satisfies the requirement in 40 CFR 64.3(b)(4)(iii). CAM does not require monitoring of any specific indicator, nor does it require that multiple indicators be monitored. Rather, monitoring must simply be completed for at least one indicator at least once per 24-hour period. The current control devices (i.e., baghouses and cyclones) are not equipped with pressure drop monitors, the proposed daily monitoring meets all CAM requirements under 40 CFR 64.3, and the proposed monitoring is sufficient to provide reasonable assurance of compliance with applicable emission limitations or standards. For the Pellet Mills and Coolers, upon completion of the proposed modifications, monitoring will no longer be conducted at the cyclones but rather at the RTO/RCO (i.e., combustion zone temperature). Installation of pressure drop monitors on the cyclones to cover pre-modification operations would be costly and burdensome for the Ahoskie plant, and these devices will be rendered useless after the modification is complete. As such, Enviva requests that DAQ not require pressure drop monitoring.

In 40 CFR 64.8(a), EPA recommends a QIP threshold of 5 percent of the duration of a pollutant-specific emissions unit's operating time for a reporting period. Based on this recommendation, Enviva proposes the

following QIP thresholds summarized in Table 1 below. These thresholds are based on 5% of each source' permitted operating hours (8,760 hours per year). Updated CAM plans, which include QIP thresholds, are provided as part of the revised permit application in Attachment 2.

Table 1. CAM Indicators and Proposed QIP Thresholds for Pre- and Post-Modification

Source	Control Device	Indicator 1
Pellet Mills and Coolers	Pre-Modification: CD-CLR-C1 through CD-CLR-C3	Indicator: Daily Visible Emissions Observation QIP Threshold: 219 hours of visible emissions per semi-annual reporting period
	Post-Modification: CD-CLR-C1 through CD-CLR-C4 (exhausting through CD-RCO)	Indicator: Combustion Zone Temperature QIP Threshold: 219 hours of operation per semi-annual reporting period with a combustion zone temperature below the minimum average combustion zone temperature established during compliance testing
Fines Bin	Pre- and Post-Modification: CD-FB-BV	Indicator: Daily Visible Emissions Observation QIP Threshold: 219 hours of visible emissions per semi-annual reporting period
Finished Product Handling; Truck Loadout Bin; Two Pellet Loadouts	Pre- and Post-Modification: CD-FPH-BF	Indicator: Daily Visible Emissions Observation QIP Threshold: 219 hours of visible emissions per semi-annual reporting period

Since reporting is required on a semi-annual basis, the proposed QIP thresholds are derived as follows:

$$8{,}760\frac{hr}{yr}\ x\ 5\% = 438\frac{hr}{yr} = 219\ hours\ per\ semi-annual\ reporting\ period$$

3. *No CAM plan was submitted for the dryer and its controls. Please provide a CAM plan for the dryer which is controlled by the wet electrostatic precipitator (WESP) before the modification. For post modification CAM, the green hammermill sources should be combined with the dryer.*

The dryer is not subject to CAM. Pre-controlled potential PM emissions from the furnace/dryer are less than the applicable process weight limit under 15A NCAC 02D .0515. As such, the WESP is not required to achieve compliance with this emission limit and, therefore, the source is not subject to CAM. The same is also true for the green hammermills. Please refer to the CAM applicability analyses provided in Attachment 1.

4. *The proposed CAM for the dry hammermills is for post modification and excludes the large fabric filters as control devices. The background for your proposed CAM plan notes "…100% of the dry hammermill exhaust will be controlled by a baghouse…" For pre modification, the indicators should be weekly visible emissions and a daily pressure drop. For post modification, the CAM indicators should be pressure drop and those associated with the WESP (secondary voltage, current, number of grids, etc.). The dust control system source was not in the proposed CAM plan but should be combined with the dry hammermills.*

As documented in the CAM applicability analyses provided in Attachment 1, the Dry Hammermills are not subject to CAM. Although the dry hammermills are subject to a PM limit under 15A NCAC 02D .0515, pre-controlled emissions from each dry hammermill are less than 100 tpy and are also less than the applicable PM emission limit.

As documented in Attachment 1, the potential uncontrolled PM emissions from the Dust Control System are less than 100 tpy; therefore, the Dust Control System is not subject to CAM.

5. *The pellet coolers are currently controlled by the cyclones. The proposed CAM plan used the quench duct inlet as a control device. The quench system as a control device contradicts this permit application, all other Enviva facilities in NC, and should be removed as an indicator. The sources' indicators should be weekly visible emissions and daily pressure drop ranges for the cyclones.*

Please refer to the CAM plans included in Attachment 2, which address the Pellet Mills and Coolers both prior to and after completion of the proposed modifications. Prior to installation of the RTO/RCO Enviva proposes daily visible emissions observations at the outlet of the cyclones and after installation of the RTO/RCO Enviva proposes continuous monitoring of the combustion zone temperature of the RTO/RCO which meets all requirements under 40 CFR 64.3. As previously stated, CAM does not require monitoring of any specific indicator, nor does it require that multiple indicators be monitored. Rather, CAM only requires that monitoring be completed for at least one indicator at least once per 24-hour period. The Pellet Cooler cyclones are not equipped with pressure drop monitors and the proposed monitoring is sufficient to provide reasonable assurance of compliance with applicable emission limitations and standards. Installation of pressure drop monitors on the cyclones would be costly and burdensome for the Ahoskie plant, and these devices will be rendered useless after the modification is complete. As such, Enviva requests that DAQ not require pressure drop monitoring.

6. *It appears the dry shavings hammermill (DSHM) is an existing source that is not on the current permit and does not have a control device but is subject to CAM post modification. Please explain CAM pre modification potential emissions and what would be the CAM indicators if applicable. One proposed post modification DSHM source indicator is the quench duct system. See No. 5 comments*

on quench duct above. The DSHM and the dried wood silo are controlled by a bin vent filter and daily visible emission are acceptable for CAM. The dried wood silo was not in the proposed CAM plan but should be combined with the DSHM.

As documented in the CAM applicability analyses provided in Attachment 1, the dry shavings hammermill is not subject to CAM either pre- or post-modification. Although the dry shavings hammermill is subject to a PM limit under 15A NCAC 02D .0515, pre-controlled emissions from the dry shavings hammermill are both less than 100 tpy and less than the applicable PM emission limit.

As shown in Attachment 1, uncontrolled emissions from the Dried Wood Day Silo are both less than 100 tpy and less than the applicable PM emission limit; therefore, CAM does not apply to this source.

7. *A CAM plan was not submitted for VOCs from the applicable sources (dryers, dry hammermills, dry shavings hammermills, pellet mills, and pellet coolers). A post modification CAM plan should be submitted for the two oxidizers with primary and secondary indicators.*

None of the aforementioned sources will be subject to a VOC emission limit or standard post-modification; therefore, CAM does not apply for VOC. The current Ahoskie Title V permit includes a facility-wide VOC limit to ensure past modifications did not trigger PSD requirements. Potential facility-wide VOC emissions upon installation of the proposed RTO and RTO/RCO will be well below the PSD major source threshold (125 tpy) and the plant will become a true minor source with respect to PSD upon commencement of operation of the proposed RTO and RTO/RCO. Therefore, no facility-wide VOC limit will be required following installation of the controls. Furthermore, CAM applies to individual emission units subject to an applicable emission standard.[2] As facility-wide VOC limits are not considered individual emission unit limits, they would not be considered emission limits or standards subject to CAM. As such, CAM does not apply for VOC.

8. *Provide the origin and details of the PM, PM10, PM2.5, VOC, and NOx emission factors from the dryer and dry hammermills system.*

Please refer to Table 2 below for the origin and details of the emission factors for the dryer, green hammermills, and dry hammermills controlled via WESP and RTO.

[2] §64.1 references the definition of "emissions unit" provided under 40 CFR 70 which is as follows: "***any part or activity*** *of a stationary source that emits or has the potential to emit any regulated air pollutant or any pollutant listed under section 112(b) of the Act."*

Table 3. Dry Shavings Hammermill, Pellet Mill, and Pellet Cooler Emission Factor Basis				
Source	**Pollutant**	**Emission Factor (lb/ODT)**	**Contingency**	**Reference**
Dry Shavings Hammermill	$PM/PM_{10}/PM_{2.5}$	0.0011	330%	Hamlet January 2020 (assumes 95% control by WESP)
Dry Shavings Hammermill	VOC as propane	0.070	55%	95% upper confidence level of Greenwood October 2017, Greenwood December 2018, Sampson December 2019, Sampson December 2020, Amory October 2013, Hamlet January 2020 (assumes 95% control by RTO, adjusted for pine percentage)
Pellet Mills and Pellet Coolers	$PM/PM_{10}/PM_{2.5}$	0.012	20%	95% upper confidence level of Southampton August 2021, Greenwood January 2019, Greenwood March 2019, Northampton July 2021, Hamlet January 2020, Hamlet December 2020
	VOC as propane	0.11	30%	95% upper confidence level of Southampton August 2021, Greenwood January 2019, Greenwood March 2019, Northampton July 2021, Hamlet January 2020, Hamlet December 2021, Waycross May 2021

10. Submit the diameter of existing simple cyclone CD-CLR-C3.

The stack diameter of CD-CLR-C3 is 0.71 meters.

11. Submit estimated potential emissions from the dust collection system ES-DCS. DCS is a separate source controlled by the dry hammermill fabric filters.

Please refer to the CAM applicability analysis provided in Attachment 1. Uncontrolled emissions from the dust collection system are less than 100 tpy and are also less than the applicable PM emission limit. As such, CAM does not apply to this source.

12. Submit a clean flow diagram. The submitted scanned version is difficult to read.

Please refer to the updated process flow diagram included in Attachment 2.

13. The dry wood handling source has no control device but the same sources at other NC Enviva facilities do. Please explain the low particulate potential emission factors versus other facilities. Refer to Enviva Northampton July 22, 2020 additional information letter for dry wood handling.

Dried wood handling (ES-DWH) at the Ahoskie plant consists of partially enclosed conveyor systems, conveyor transfer points located along the post-dryer conveyance system, and a dry hammermill surge bin. Particulate emission factors for estimating emissions from dried wood handling at Ahoskie were calculated based on the drop point equation from AP-42 Section 13.2.4. Among other variables, this equation takes into consideration mean wind speed. Since the material transfer points associated with ES-DWH are primarily enclosed, the mean wind speed was assumed to be 2 miles per hour (mph) in calculating the emission factors for these transfer points, as opposed to 6.3 mph for non-enclosed transfer points. This methodology is consistent with the current permit basis for Ahoskie (Title V Permit No. 10121T04). A reduced wind speed was not utilized in the Northampton potential emissions calculations, thus the Northampton emission factors for dried wood handling transfer points are higher. Please note that the difference in emission calculation approach results in a negligible impact on overall potential PM emissions. For example, if the Ahoskie plant's dried wood handling emissions were calculated in a manner consistent with Northampton (i.e., no reduction in wind speed for partially enclosed transfer points) total PM emissions from this source would be 0.32 tpy versus the proposed potential to emit of 0.07 tpy.

As discussed above, Enviva is providing a complete replacement permit application as part of this submittal. This replacement application includes several additional proposed changes to the Ahoskie plant and reflects updates to the application previously submitted in August 2020 (Attachment 2).[3] The revised application reflects the following changes from the August 2020 application:

1. Updates to the description of the existing dust control system (ES-DCS);
2. Updates to criteria pollutant and hazardous air pollutant (HAP) emission factors;
3. Replacement of the existing 300 brake horsepower (bhp) diesel-fired fire water pump with a new 234 bhp diesel-fired fire water pump;
4. Addition of two (2) natural gas-fired boilers to provide steam to the pelletizing process;
5. Updates to the CAM applicability analysis to address pre- and post-modification operations;

[3] Telephone conversation between Richard Simpson (DAQ) and Michael Carbon (Ramboll) on November 27, 2021.

6. Updates to the potential fugitive emissions from on-road and off-road vehicles traveling on paved and unpaved areas to reflect silt loading data from a similar wood pellet manufacturing plant and the National Council for Air and Stream Improvement (NCASI);
7. Updates to potential emissions for storage pile wind erosion to utilize silt data from NCASI; and
8. Updates to the air toxics modeling analysis to address changes in HAP emission rates and the addition of the natural gas-fired boilers.

The replacement permit application includes an updated application report, potential emissions calculations, CAM plans, application forms, and an updated air toxics modeling analysis. As discussed previously, this application replaces the original permit application submitted in August 2020 and the addendum submitted in December 2020.

If you have any questions regarding the information presented in this letter or the revised permit application, please contact me at (225) 408-2691.

Yours sincerely,

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ATTACHMENT 1
CAM APPLICABILITY ANALYSES

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Table 1a. Pre-Modification CAM Applicability Analysis								
Emission Unit	Control Device	Maximum Hourly Throughput[1] (ODT/hr)	Material Moisture Content (%)	Maximum Hourly Throughput (tph)	Process Weight Limit[2] (lb/hr)	Uncontrolled PM Emissions[3] (lb/hr)	Uncontrolled PM Emissions[3] (tpy)	CAM Applicable?[4]
IES-CHP2[5]	-	--	--	--	--	--	< 5 tpy	No
ES-Dryer	CD-WESP[6]	48.0	50%	96.0	52.7	37.8	138	No
Furnace		--	--	19.5				
ES-DWDS	CD-DWDS-BV[7]	11.4	14%	13.3	23.2	18.7	82.1	No
ES-DHM-1	CD-DHM-FF1[7]	9.60	10%	10.7	20.0	3.35	14.7	No
ES-DHM-2		9.60	10%	10.7	20.0	3.35	14.7	No
ES-DHM-3	CD-DHM-FF2[7]	9.60	10%	10.7	20.0	3.35	14.7	No
ES-DHM-4		9.60	10%	10.7	20.0	3.35	14.7	No
ES-DHM-5	CD-DHM-FF3[7]	9.60	10%	10.7	20.0	3.35	14.7	No
ES-DCS		48.0	10%	53.3	45.2	10.6	46.6	No
ES-PMFS	CD-PMFS-BV[7]	57.6	11%	64.5	47.0	18.7	82.1	No
ES-DSHM	CD-DWDS-BV[7]	9.60	14%	11.2	20.6	3.35	14.7	No
ES-CLR1	CD-CLR-C1[8]	11.0	5.5%	11.6	21.2	181	792	Yes
ES-CLR2		11.0	5.5%	11.6	21.2	181	792	Yes
ES-CLR3	CD-CLR-C2[8]	11.0	5.5%	11.6	21.2	181	792	Yes
ES-CLR4		11.0	5.5%	11.6	21.2	181	792	Yes
ES-CLR5	CD-CLR-C3[8]	11.0	5.5%	11.6	21.2	181	792	Yes
ES-FB	CD-FB-BV[7]	2.75	5.5%	2.91	8.39	30.9	135	Yes
ES-FPH	CD-FPH-BV[7]	55.0	5.5%	58.2	46.0	76.1	333	Yes
ES-TLB		55.0	5.5%	58.2	46.0	76.1	333	Yes
ES-PL1		55.0	5.5%	58.2	46.0	76.1	333	Yes
ES-PL2		55.0	5.5%	58.2	46.0	76.1	333	Yes

1. Maximum hourly throughputs are consistent with the current permit basis (Title V Permit No. 10121T04).
2. Each individual emission unit is subject to a PM emission limit under 15A NCAC 02D .0515. The applicable process weight limit is calculated based on the emission unit's maximum hourly throughput (tons per hour) and the equations provided in 15A NCAC 02D .0515(a).
3. Uncontrolled emissions are calculated by dividing the potential emissions by 1 minus the assumed control efficiency for the specific particulate control device.
4. Per §64.2, an emission unit is subject to CAM if all of the following criteria are met:
    1. The emission unit is subject to an emission limitation or standard;
    2. The emission unit uses a control device to achieve compliance with the emission limitation or standard; and
    3. The emission unit has pre-controlled potential emissions of the applicable regulated air pollutant that are equal to or greater than the amount in tons per year (tpy) required for a source to be classified as a major source (i.e., 100 tpy for the Ahoskie plant).
5. The existing green hammermill (IES-CHP2) is currently uncontrolled and permitted as an insignificant activity based on potential emissions of less than 5 tpy for each criteria pollutant emitted. The green hammermill is not subject to CAM.
6. Uncontrolled emissions are calculated assuming the WESP achieves a 95% control efficiency for filterable PM and 70% control efficiency for condensable PM.
7. Uncontrolled emissions are calculated assuming baghouses achieve a 99% control efficiency for filterable PM.
8. Uncontrolled emissions are calculated assuming the cyclones achieve a 90% control efficiency for filterable PM.

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Table 1b. Post-Modification CAM Applicability Analysis								
Emission Unit	Control Device	Maximum Hourly Throughput[1] (ODT/hr)	Material Moisture Content (%)	Maximum Hourly Throughput (tph)	Process Weight Limit[2] (lb/hr)	Uncontrolled PM Emissions[3] (lb/hr)	Uncontrolled PM Emissions (tpy)	CAM Applicable?[3]
ES-Dryer	CD-WESP[5]; CD-RTO	62.8	48%	121	54.8	49.4	216	No
Furnace		--	--	20.9				
ES-GHM-1[4]		15.7	48%	30.2	40.0	31.4	138	No
ES-GHM-2[4]		15.7	48%	30.2	40.0	31.4	138	No
ES-GHM-3[4]		15.7	48%	30.2	40.0	31.4	138	No
ES-GHM-4[4]		15.7	48%	30.2	40.0	31.4	138	No
ES-DHM-1	CD-DHM-FF1[6]; CD-WESP; CD-RTO	8.97	10%	10.0	19.1	3.13	13.7	No
ES-DHM-2		8.97	10%	10.0	19.1	3.13	13.7	No
ES-DHM-6		8.97	10%	10.0	19.1	3.13	13.7	No
ES-DHM-3	CD-DHM-FF2[6]; CD-WESP; CD-RTO	8.97	10%	10.0	19.1	3.13	13.7	No
ES-DHM-4		8.97	10%	10.0	19.1	3.13	13.7	No
ES-DHM-7		8.97	10%	10.0	19.1	3.13	13.7	No
ES-DHM-5	CD-DHM-FF3[6]; CD-WESP; CD-RTO	8.97	10%	10.0	19.1	3.13	13.7	No
ES-DCS		62.8	10%	69.8	47.7	10.6	46.6	No
ES-CLR1	CD-CLR-C1[7]; CD-RCO	12.5	5.5%	13.2	23.1	205	863	Yes
ES-CLR2	CD-CLR-C2[7]; CD-RCO	12.5	5.5%	13.2	23.1	205	863	Yes
ES-CLR3	CD-CLR-C3[7]; CD-RCO	12.5	5.5%	13.2	23.1	205	863	Yes
ES-CLR4	CD-CLR-C4[7]; CD-RCO	12.5	5.5%	13.2	23.1	205	863	Yes
ES-CLR5	CD-CLR-C5[7]; CD-RCO	12.5	5.5%	13.2	23.1	205	863	Yes
ES-CLR6	CD-CLR-C6[7]; CD-RCO	12.5	5.5%	13.2	23.1	205	863	Yes
ES-DSHM	CD-DWDS-BV[6]; CD-RCO	12.0	14%	14.0	24.0	4.2	17.5	No
ES-DWDS		12.0	14%	14.0	24.0	18.7	82.1	No
ES-PMFS	CD-PMFS-BV[6]	74.8	10%	83.1	49.4	18.7	82.1	No
ES-FPH	CD-FPH-BF[6]	74.8	5.5%	79.1	49.0	76.1	333	Yes
ES-TLB		74.8	5.5%	79.1	49.0	76.1	333	Yes
ES-PL1		74.8	5.5%	79.1	49.0	76.1	333	Yes
ES-PL2		74.8	5.5%	79.1	49.0	76.1	333	Yes
ES-FB	CD-FB-BV[6]	3.74	5.5%	3.96	10.3	30.9	135	Yes

1. Maximum hourly throughputs equal to proposed potential emissions basis.
2. Each individual emission unit is subject to a PM emission limit under 15A NCAC 02D .0515. The applicable process weight limit is calculated based on the emission unit's maximum hourly throughput (tons per hour) and the equations provided in 15A NCAC 02D .0515(a).
3. Per §64.2, an emission unit is subject to CAM if all of the following criteria are met:
    1. The emission unit is subject to an emission limitation or standard;
    2. The emission unit uses a control device to achieve compliance with the emission limitation or standard; and
    3. The emission unit has pre-controlled potential emissions of the applicable regulated air pollutant that are equal to or greater than the amount in tpy required for a source to be classified as a major source (i.e., 100 tpy for the Ahoskie plant).
4. Uncontrolled emissions for the green hammermills assume the material recovery cyclones recover 99.9% of the wood fiber.
5. Uncontrolled emissions are calculated assuming the WESP achieves a 95% control efficiency for filterable PM and 70% control efficiency for condensable PM.
6. Uncontrolled emissions are calculated assuming baghouses achieve a 99% control efficiency for filterable PM.
7. Uncontrolled emissions are calculated assuming the cyclones achieve a 90% control efficiency for filterable PM.