RAMBOLL

ENVIRONMENT
& HEALTH

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

Re: **Addendum to Application for Modification of Air Quality Permit (8200152.20B)**
Enviva Pellets Sampson, LLC
Sampson County, North Carolina
Air Quality Permit No.: 10386R04
Facility ID: 8200152

Dear Mr. Willets:

December 11, 2020

Ramboll US Consulting, Inc (Ramboll) is submitting this addendum to the application dated April 2, 2020 for an air permit modification which requested authorization for several changes at the Enviva Pellets Sampson, LLC (Enviva) plant (Sampson plant) located in Sampson County (Facility ID #8200152). This addendum is being submitted in response to a November 20, 2020 email request from Betty Gatano that Enviva provide an updated discussion of the furnace and dryer bypasses and an updated emissions inventory for these emission sources, if necessary.[1] As requested, this addendum addresses use of the furnace and dryer bypass stacks during cold start-up, shutdown, and furnace idle mode. Enviva is also clarifying that diesel fuel may be used as an accelerant for cold start-up of the furnace. The amount of fuel used per event will typically be 15-30 gallons and 100-200 gallons per year.

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The following summarizes the conditions under which the furnace and dryer bypass stacks at the Sampson plant are used and is consistent with the updated initial Title V application submitted on October 1, 2020. Revised application pages are included as Attachment 1, updated application forms are provided as Attachment 2, and an updated process flow diagram is provided as Attachment 3.

Furnace and Dryer Bypass Stacks (ES-F/DBYPASS)

Bypass stacks for the furnace and dryer are used to exhaust hot gases during start-ups (for temperature control), shutdowns, and malfunctions. Specifically, the furnace bypass stack is used in the following situations:

- **Cold Start-ups:** The furnace bypass stack is used when the furnace is started up from a cold shutdown until the refractory is sufficiently heated and can sustain operations at a low level (approximately 15% of the maximum heat input rate). The bypass stack is then closed, and flue gas routed through the Dryer and its emission control equipment (WESP and

[1] Email from Betty Gatano (DAQ) to Michael Carbon (Ramboll) dated November 20, 2020.

RTO) and the furnace is slowly brought up to a normal operating rate. Diesel fuel may be used as an accelerant for cold start-up. The amount used per event is approximately 15-30 gallons and the annual usage is approximately 200 gallons; therefore, emissions resulting from diesel combustion are insignificant.

- **Idle mode:** The furnace may also operate in idle mode [up to 10 Million British thermal units per hour (MMBtu/hr)] with emissions routed to the furnace bypass stack. The purpose of operation in idle mode is to maintain the temperature of the fire brick lining the furnace which may be damaged if it cools too rapidly. Operation in "idle mode" also significantly reduces the amount of time required to restart the furnace.

- **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. The remaining fuel is combusted prior to opening the furnace bypass stack. The furnace bypass stack is not utilized until after the furnace achieves an idle state (10 MMBtu/hr or less). Until this time, emissions continue to be controlled by the wet electrostatic precipitator (WESP) and regenerative thermal oxidizer (RTO).

- **Malfunction:** The furnace automatically aborts to the furnace bypass stack in the event of a malfunction. This may be caused by failsafe interlocks associated with the operation of furnace or dryer and emissions control systems. Typically interlocks divert flue gas to the bypass stacks in the event of loss of utilities (electricity, water, compressed air), 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, the fuel feed is stopped, and the heat input rate drops rapidly.

Conditions under which the dryer bypass stack is used are as follow:

- **Cold Start-ups and Transition from Furnace Idle:** The dryer bypass stack is used when the furnace is started up from a cold shutdown and when the furnace transitions from idle mode to normal operation. Emissions are vented through the dryer bypass stack for approximately 10 minutes as exhaust flow is transitioned from the furnace bypass stack to the WESP and RTO. The dryer is not operational during this time and emissions are due solely to combustion of fuel in the furnace.

- **Planned Shutdown:** During planned shutdowns, as the remaining fuel is combusted by the furnace, the Operator reduces the chip input to the dryer. When only a small amount of chips remain, the dryer drum is emptied. The dryer bypass stack is then opened, and a purge air fan is used to ensure no explosive build-up occurs in the drum. Emissions during this time are negligible and have not been quantified, as the furnace is directed to its abort stack (see furnace planned shutdown above) and the dryer is no longer operating.

- **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 the facility-wide potential emissions.

As described above, emissions during cold start-ups, planned shutdowns, and furnace idle are due solely to combustion of fuel in the furnace. The dryer is not operational during these periods. The potential emissions included in the April 2, 2020 application for the furnace bypass stack (ES-FBYPASS) accurately reflect emissions from fuel combustion in the furnace during each of these operating modes and thus fully account for emissions from the dryer bypass stack. As such, no revisions to potential emission estimates are required. In an effort to align the source description with the potential to emit emission estimates, Enviva requests that the ES-FBYPASS and ES-DBYPASS sources be combined and referred to as ES-F/DBYPASS as the potential to emit emission estimates for ES-FBYPASS reflect emission from both ES-FBYPASS and ES-DBYPASS sources.

Finally, NCDEQ requested that previous modeling for toxic air pollutants (TAP) be assessed to determine whether revised modeling is warranted to address dryer bypass stack emission venting. Based on a detailed review of the previous modeling results, the negligible emissions vented from the dryer bypass stack, and the understanding that these emissions have already been accounted for in the furnace bypass stack modeled emission rates, Enviva does not believe updated modeling is warranted. Total TAP emissions released through the dryer bypass stack will be less than 0.25 pounds during each cold start-up event, less than 0.065 pounds during each idle event, and less than 0.003 tons per year. Given the magnitude and brief duration that emissions from the furnace are vented through the dryer bypass stack (approximately 10 minutes per event) and the previous modeling results, Enviva believes that revised modeling is not warranted.

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

Yours sincerely

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ATTACHMENT 1
REPLACEMENT APPLICATION PAGES

1. INTRODUCTION

Enviva Pellets Sampson, LLC (Enviva) owns and operates a wood pellet manufacturing plant (referred to herein as "the Sampson plant", "the plant", or "the facility") in Sampson County, North Carolina. The plant currently operates under Air Quality Permit No. 10386R04 issued by the North Carolina Department of Environmental Quality (NCDEQ), Division of Air Quality (DAQ) on October 2, 2019. The plant consists of the following processes: Log Chipper, Bark Hog, Green Hammermills, Rotary Dryer, Dry Hammermills, Pellet Mills and Coolers, Product Loadout operations and other ancillary activities.

Air Quality Permit No. 10386R04 authorized changes to the Sampson plant in order to meet new customer softwood percentage and production rate demands and to incorporate significant emission reduction efforts to minimize emissions impacts associated with the project. Enviva is submitting this application in accordance with Condition 2.1.A.4.a of Air Quality Permit No. 10386R04 to request authorization to install a regenerative thermal oxidizer (RTO) / regenerative catalytic oxidizer (RCO) to control emissions from the Pellet Mills and Pellet Coolers as well as authorization to route the exhaust from the Dry Hammermills to the existing Dryer line wet electrostatic precipitator (WESP) and RTO. A significant reduction in emissions of VOC (718 tpy) and HAP (128 tpy) will occur as a result of controlling emissions from the Dry Hammermills, Pellet Mills, and Pellet Coolers. As discussed below, after installation of these controls, the Sampson plant will be classified as a synthetic minor source for PSD requirements and for HAP emissions.

As part of this submittal, Enviva is also proposing the following changes:

- Remove the current throughput limitation on the Dry Hammermills (Condition 2.2.A.1.j);
- Add two (2) natural gas/propane-fired burners, each with a heat input capacity of 2.5 million British thermal units per hour (MMBtu/hr) to heat the dryer system ducts;
- Modifications to optimize operation of the Dryer line RTO (CD-RTO) and increase the permitted heat input of the RTO to allow for injection of natural gas;
- Revise the potential emissions for Dried Wood Handling (ES-DWH) and the Dryer and Green Hammermills (both controlled by CD-RTO) to reflect results from December 2019 compliance testing;
- Increase the heat input of furnace idle mode from 5 MMBtu/hr to 10 MMBtu/hr (ES-FBYPASS) and reflect the use of diesel fuel as an accelerant in the furnace during cold start-up; and
- Increase the fraction of PM that is $PM_{2.5}$ for the Finished Product Handling baghouse (CD-FPH-BH).

The Sampson plant as currently permitted is a major source with respect to the Title V Operating Permit Program and New Source Review (NSR) permitting programs because facility-wide potential emissions of one or more criteria pollutants exceed the major source thresholds of 100 tons per year (tpy) and 250 tpy, respectively. Additionally, the plant is currently considered a major source of hazardous air pollutants (HAP) due to total HAP emissions and maximum individual HAP emissions exceeding the major source thresholds of 25 tpy and 10 tpy respectively. Upon implementation of the proposed changes the plant will no longer be a major source with respect to NSR or a major source of HAP.

Section 2 outlines the proposed permit revisions, and a process description for sources impacted by the proposed changes is provided in Section 3. Methodologies used to quantify potential emissions are summarized in Section 4. Section 5 describes the applicability of federal and state permitting programs. Section 6 includes a detailed applicability analysis of both federal and state regulations. The completed air permit application forms are included in Appendix A. An area map and process flow diagram are included in Appendices B and C, respectively. Detailed potential emissions calculations are provided in Appendix D. Note that forms and calculations are only included for sources impacted by the proposed changes.

2. REQUESTED PERMIT REVISIONS

Enviva requests that the procedures of 15A North Carolina Administrative Code (NCAC) 2Q .0504 be utilized for this modification, allowing issuance of a construction and operating permit under 15A NCAC 2Q .0300. This application is being submitted to request authorization to implement emission controls for the Dry Hammermills and the Pellet Mills and Pellet Coolers in accordance with Condition 2.1.A.4.a of Air Quality Permit No. 10386R04, and for authorization to implement several other proposed changes for existing sources/equipment.

The following summarizes the proposed permit revisions:

- Control of volatile organic compound (VOC), HAP, and particulate matter emissions from the Dry Hammermills.

  Enviva proposes to implement an air flow recirculation process to route a portion of the exhaust from each Dry Hammermill back to the front end of the respective Dry Hammermill. All exhaust gases ultimately exiting the Dry Hammermill baghouses will be routed to a quench duct and then to either the Dryer (ES-DRYER-1) furnace followed by the WESP (CD-WESP-1) or directly to the WESP (or a combination of the two) followed by the RTO (CD-RTO-1) for emissions control. The purpose of the quench duct is to protect the RTO by reducing the risk of fire. Operation of the Dry Hammermills will be interlocked with operation of the quench duct (i.e., the quench duct must operate in order for the Dry Hammermills to operate). If flow in the quench duct drops below the safe level, the Dry Hammermills will shut down.

  Total emissions from the Dry Hammermills will still be routed through the existing baghouses. The purpose of the recirculation is to reduce the volume of air that is routed to the downstream control devices (i.e., CD-WESP and CD-RTO).

- Control of VOC and HAP emissions from the Pellet Mills and Pellet Coolers.

  Enviva proposes to install a dedicated RTO/RCO (CD-RCO) to control VOC and HAP emissions from the Pellet Mills and Pellet Coolers. The exhaust from the six (6) existing Pellet Cooler cyclones will be routed to a quench duct and then to an RTO/RCO that will primarily operate in catalytic mode with thermal as a back-up during catalyst cleaning. The purpose of the quench duct is to protect the RTO/RCO by reducing the risk of fire.

- Enviva proposes to remove the current Dry Hammermill throughput limitation of 558,450 oven dried tons (ODT), which represents 85% of the plant's maximum production rate of 657,000 ODT per consecutive 12-month period. With this application, Enviva is proposing to increase the Dry Hammermill throughput to 657,000 ODT per consecutive 12-month period. Emissions increases associated the Dry Hammermill throughput increase are minimal and are completely offset by the significant facility-wide emission reductions resulting from changes proposed in this application.

- Enviva proposes to add two (2) natural gas/propane-fired burners, each with a maximum heat input of 2.5 MMBtu/hr, to heat the dryer system ducts (IES-DDB-1 through IES-DDB-2). As flue gas exits the dryer and begins to cool, wood tar can condense and coat the inner walls of the dryer ducts creating a fire risk. In order to prevent condensation from occurring, and thus reduce the fire risk, the two (2) ducts (herein referred to as double ducts) on the dryer system will be heated. Potential emissions from the duct burners are

below the thresholds in 15A NCAC 02Q .0503(8) and they are thus considered insignificant activities.

- Enviva is proposing several modifications to optimize operation of the existing Dryer line RTO (CD-RTO) including changing the media to decrease the differential pressure, enlarging the ductwork and poppet valves to allow for more air flow, addition of two (2) canisters with combustion zone and additional burners. Enviva is also requesting authorization for injection of natural gas into the RTO which will reduce the amount of combustion air added to the RTO, thereby increasing fuel efficiency and reducing generation of nitrogen oxides (NO_X). The heat input of the RTO will be increased from 32 MMBtu/hr to 45.2 MMBtu/hr as a result of the additional burners and natural gas injection.
- Enviva proposes to revise the potential emissions for Dried Wood Handling (ES-DWH) and the Dryer and Green Hammermills (both controlled by CD-RTO) to reflect results from December 2019 compliance testing.
- Enviva proposes to increase the heat input of furnace idle mode from 5 MMBtu/hr to 10 MMBtu/hr (ES-FBYPASS). Enviva has determined that 5 MMBtu/hr is insufficient for maintaining a flame in the furnace. In an effort to align the source description with potential to emit emission estimates, Enviva requests that the ES-FBYPASS and ES-DBYPASS sources be combined and referred to as ES-F/DBYPASS as the potential to emit emission estimates for ES-FBYPASS reflect emission from both ES-FBBYASS and ES-DBYPASS sources. Also, Enviva is clarifying that diesel fuel may be used as an accelerant for cold start-up of the furnace. The amount of fuel used per event will typically be 15-30 gallons and 100-200 gallons per year.
- Enviva proposes to increase the fraction of PM that is $PM_{2.5}$ for the Finished Product Handling baghouse (CD-FPH-BH). The permit application submitted in August of 2014 incorrectly calculated $PM_{2.5}$ emissions as 0.35% of PM emissions. This results in an exit grain loading rate that is cleaner than ambient air and would require a sampling run of over 100 hours to quantify [0.000014 grains per standard cubic feet (gr/scf)]. Enviva has not been able to find any documentation to support a value of 0.35% and, given that this results in a concentration that is cleaner than ambient air, Enviva believes this value was used in error. Based on a review of National Council for Air and Stream Improvement, Inc. (NCASI) particle size distribution data for similar baghouses used in the wood products industry, Enviva has determined that the correct fraction of PM that is $PM_{2.5}$ is 40%. As such, Enviva is revising the potential emissions for the Finished Production Handling baghouse to reflect an exit grain loading rate of 0.0016 gr/scf (filterable only).

3. PROCESS DESCRIPTION

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

The following sections provide a description of the sources that will be impacted by this application. An area map and process flow diagram are provided in Appendices B and C, respectively.

3.1 Green Hammermills (ES-GHM-1 through 3) and Dryer (ES-DRYER)

Green wood that has passed through the chipper is further processed in the Green Hammermills (ES-GHM-1, 2, and 3) to reduce material to the proper size. Exhaust from the Green Hammermills is routed to the dryer WESP/RTO control system (CD-WESP/CD-RTO) to control PM, VOC, and HAP emissions. Processed wood is then conveyed to a single rotary Dryer system (ES-DRYER). Direct contact heat is provided to the system via a 250.4 MMBtu/hr furnace burner system which combusts bark and wood chips as fuel. Green wood is fed into the Dryer where the moisture content is reduced to the desired level and routed to four (4) identical material recovery cyclones operating in parallel, which capture dried wood for further processing. Exhaust from the Dryer cyclones is combined into a common duct which includes the vent from the Green Hammermills (ES-GHM-1 through 3) and is routed to the WESP (CD-WESP) and RTO (CD-RTO) for control of particulates, VOC, and HAP. Potential emissions from the RTO stack have been revised to reflect results from December 2019 compliance testing. Additional detail is provided in Section 4.1.

3.2 Dried Wood Handling (ES-DWH)

There are several conveyor transfer points comprising emission source ES-DWH that are located between the Dryer and Dry Hammermills. These sources are completely enclosed with only two (2) emission points that are controlled by individual baghouses (CD-DWH-BH-1 and 2). Potential emissions from the baghouses have been revised to reflect results from December 2019 compliance testing. Additional detail is provided in Section 4.4.

3.3 Dry Hammermills (ES-HM-1 through 8)

Dried wood chips from the Dryer product recovery cyclones are conveyed to screening operations that remove smaller wood particles. Smaller particles passing through the screens

are diverted to the Dry Hammermill Discharge Conveyor, while oversized wood is diverted to the Dry Hammermills (ES-HM-1 through 8) for further size reduction prior to pelletization. Note, upon removal of the Dry Hammermill throughput limitation, the screeners may or may not be used during normal process operations. Each Dry Hammermill includes a material recovery cyclone to capture milled fiber for further processing. Particulate emissions from the eight (8) Dry Hammermills are controlled using eight (8) baghouses (CD-HM-BH-1 through 8). Dust generated from transfer operations around the screening operation is diverted to the Dry Hammermill Area filtration system (ES-HMA).

Enviva proposes to implement an air flow recirculation process to route a portion of the exhaust from each Dry Hammermill back into the front end of the respective Dry Hammermill. All exhaust gases ultimately exiting the Dry Hammermill baghouses will be routed to a quench duct and then to either the Dryer (ES-DRYER-1) furnace followed by the WESP (CD-WESP-1), directly to the WESP, or a combination of the two, followed by the RTO (CD-RTO-1) for emissions control. The purpose of the quench duct is to protect the RTO by reducing the risk of fire. Operation of the Dry Hammermills will be interlocked with operation of the quench duct (i.e., the quench duct must operate in order for the Dry Hammermills to operate). If flow in the quench duct drops below the safe level, the Dry Hammermills will shut down.

3.4 Pellet Mills and Pellet Coolers (ES-CLR-1 through 6)

Sized wood from the Dry Hammermills is mechanically compressed through Pellet Mills. Exhaust from the twelve (12) Pellet Mills and Pellet Mill conveyors are currently vented through the cooler aspiration cyclones and then to the atmosphere. No resin or other chemical binding agents are needed for pelletization.

Formed pellets are discharged into one of six (6) Pellet Coolers (ES-CLR-1 through ES-CLR-6). Cooling air is passed through the pellets. At this point, the pellets contain a small amount of wood fines which are swept out with the cooling air and are controlled utilizing six (6) cyclones operating in parallel prior to discharge to the atmosphere (CD-CLR-1 to 6).

As described in Section 2, Enviva is proposing to install a dedicated RTO/RCO (CD-RCO) to control VOC and HAP emissions from the Pellet Mills and Pellet Coolers. The exhaust from the six (6) existing Pellet Cooler cyclones will be routed to a quench duct and then to an RTO/RCO that will primarily operate in catalytic mode with thermal as a back-up during catalyst cleaning. The purpose of the quench duct is to protect the RTO/RCO by reducing the risk of fire. Operation of the Pellet Mills and Cooler will be interlocked with operation of the quench duct (i.e., the quench duct must be ready for operation for the Pellet Mills and Cooler to operate).

3.5 Furnace and Dryer Bypass Stacks (ES-F/DBYPASS)

Direct heat is provided to the dryer via a 250.4 MMBtu/hr wood-fired furnace. During normal operations, emissions from wood combustion in the furnace are controlled by the WESP (CD-WESP) and RTO (CD-RTO). Bypass stacks for the furnace and dryer are used to exhaust hot gases during start-ups (for temperature control), shutdowns, and malfunctions. Specifically, the Furnace Bypass Stack is used in the following situations:

- **Cold Start-ups:** The furnace bypass stack is used when the furnace is started up from a cold shutdown until the refractory is sufficiently heated and can sustain operations at a low level (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 and flue gas

routed through the Dryer and its emission control equipment (WESP and RTO). Diesel fuel may be used as an accelerant for cold start-up. The amount used per event is approximately 15-30 gallons and the annual usage is approximately 200 gallons; therefore, emissions resulting from diesel combustion are insignificant.

- **Idle mode:** The furnace may also operate in idle mode with emissions routed to the furnace bypass stack. "Idle mode" was previously defined as operation up to a maximum heat input rate of 5 MMBtu/hr. With this application, Enviva is proposing to increase the maximum heat input for furnace idle mode to 10 MMBtu/hr after determining that 5 MMBtu/hr is insufficient to maintain a flame in the furnace. The purpose of operation in idle mode is to maintain the temperature of the fire brick lining in the furnace which may be damaged if it cools too rapidly. Operation in idle mode also significantly reduces the amount of time required to restart the furnace.
- **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. The remaining fuel is combusted prior to opening the furnace bypass stack. The furnace bypass stack is not utilized until after the furnace achieves an idle state (10 MMBtu/hr or less). Until this time, emissions continue to be controlled by the WESP and RTO.
- **Malfunction:** The furnace automatically aborts to the bypass stack in the event of a malfunction. This may be caused by failsafe interlocks associated with the furnace or dryer and emissions control 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, the fuel feed is stopped, and the heat input rate drops rapidly.

Conditions under which the Dryer Bypass Stack is used are as follow:

- **Cold Start-ups and Transition from Furnace Idle:** The dryer bypass stack is used when the furnace is started up from a cold shutdown and when the furnace transitions from idle mode to normal operation. Emissions are vented through the dryer bypass stack for approximately 10 minutes as exhaust flow is transitioned from the furnace bypass stack to the WESP and RTO. The dryer is not operational during this time and emissions are due solely to combustion of fuel in the furnace. Emissions during these brief transition periods are not separately quantified to avoid double-counting, as these emissions are already included under the furnace cold start-up and idle mode conditions.
- **Planned Shutdown:** During planned shutdowns, as the remaining fuel is combusted by the furnace, the Operator reduces the chip input to the dryer. When only a small amount of chips remain, the dryer drum is emptied. The dryer bypass stack is then opened, and a purge air fan is used to ensure no explosive build-up occurs in the drum. Emissions during this time are negligible and have not been quantified, as the furnace is directed to its abort stack (see furnace planned shutdown above) and the dryer is no longer operating.
- **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 the facility-wide potential emissions. As described above, emissions during cold start-ups, planned shutdowns, and furnace idle are due solely to combustion of fuel in the furnace. The dryer is not operational during these periods. The potential emissions for the furnace bypass stack (ES-FBYPASS) from fuel combustion in the furnace during each of the above operating modes fully account for emissions from the dryer bypass stack. As such Enviva requests that the ES-FBYPASS and ES-DBYPASS sources be combined and referred to as ES-F/DBYPASS as the potential to emit emission estimates for ES-FBYPASS reflect emission from both ES-FBYPASS and ES-DBYPASS sources.

3.6 Dryer Double Duct Burners (IES-DDB-1 and 2)

As flue gas exits the dryer and begins to cool, wood tar can condense and coat the inner walls of the dryer ducts creating a fire risk. In order to prevent condensation from occurring and thus reduce the fire risk, the two (2) 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 (1) low-NO_X burner with a maximum heat input rating of 2.5 MMBtu/hr and a second 2.5 MMBtu/hr low-NO_X burner will be used to heat the duct used for exhaust gas recirculation and the WESP. The burners will combust natural gas, with propane as back-up, and will exhaust directly to the atmosphere. Potential emissions from the duct burners are below the thresholds in 15A NCAC 02Q .0503(8) and they are thus considered insignificant activities.

3.7 Finished Product Handling and Loadout (ES-PB1 through 4 and ES-PL-1 and 2)

Final product is conveyed to four (4) Pellet Loadout Bins (ES-PB-1 through ES-PB-4) that feed the truck loadout station which includes two loadout spouts (ES-PL-1 and ES-PL-2). At the truck loadout station, pellets are gravity fed into trucks through two (2) covered chutes that automatically telescope upward during the loadout process to maintain constant contact with the product as it is loaded to prevent emissions. A slight negative pressure is maintained in this area of the loadout building using an induced draft fan which exhausts to the Finished Product Handling baghouse (CD-FPH-BH). Negative pressure is maintained as a fire prevention measure to prevent any build-up of dust on surfaces within the building. The Finished Production Handling baghouse controls emissions from Finished Product Handling (ES-FPH), the four (4) Pellet Loadout Bins (ES-PB-1 through ES-PB-4), and Truck Loadout Operations (ES-PL-1 and ES-PL-2). Trucks are covered immediately after loading.

4. POTENTIAL EMISSIONS QUANTIFICATION

This section discusses quantification of potential emissions for those sources that will be impacted by this application. The revised facility-wide potential emissions and updated calculations for sources with proposed changes are included in Appendix D.

4.1 Dryer (ES-DRYER) and Green Wood Hammermills (ES-GHM-1 through ES-GHM-3)

Exhaust from the Dryer and Green Wood Hammermills is routed to a WESP/RTO (CD-WESP/CD-RTO) control system for control of particulate matter, VOC, and hazardous air pollutants (HAPs). PM, PM less than 10 microns in diameter (PM_{10}), PM less than 2.5 microns in diameter ($PM_{2.5}$), carbon monoxide (CO), and oxides of nitrogen (NO_x) emissions were updated to reflect results of the Sampson December 2019 compliance test plus an appropriate contingency based on engineering judgement. Potential emissions of sulfur dioxide (SO_2) from green wood combustion were calculated based on the heat input of the furnace and an emission factor for wood combustion from AP-42, Section 1.6, *Wood Residue Combustion in Boilers*[1]. VOC emissions were calculated using an emission factor derived from process information and an appropriate contingency based on engineering judgement. HAP and toxics air pollutant (TAP) emissions from green wood combustion were calculated based on emission factors from several data sources including site-specific stack testing data and process information with an appropriate contingency based on engineering judgement and emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*.

HAP and TAP emissions from natural gas and propane combustion by the RTO as burner fuel and injection gas[2] were calculated based on AP-42 Section 1.4, *Natural Gas Combustion*[3], AP-42 Section 1.5*, Liquefied Petroleum Gas Combustion*[4]*,* NC DAQ's Wood Waste Combustion Spreadsheet[5], and emission factors from the South Coast Air Quality Management District's (SCAQMD) Air Emissions Reporting (AER) Tool. After direct natural gas injection and proposed RTO optimization efforts, the maximum heat input of the RTO will be 45.2 MMBtu/hr based on both the heat input of the RTO burners and direct natural gas injection. Detailed emission calculations are included in Appendix D.

4.2 Dry Hammermills (ES-HM-1 through ES-HM-8)

Dry Hammermill operations generate particulate matter, HAP, and VOC emissions during sizing of dried wood. Emissions from the eight (8) Dry Hammermills are routed to baghouses for control of PM emissions (CD-HM-BH-1 through 8). Particulate emissions from each baghouse were calculated using an exit grain loading rate and the maximum nominal exhaust flow rate of the baghouse. Exhaust from the baghouses will be routed through a quench system and then to either the Dryer (ES-DRYER) furnace, the Dryer WESP (CD-WESP), or a combination of the two, followed by the Dryer line RTO (CD-RTO). A 92.75% control efficiency was applied to the Dry Hammermill particulate emissions for the WESP.

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

[2] Natural Gas Injection in an RTO is a way of reducing the amount of combustion air added to an RTO thereby increasing fuel efficiency and reducing NOx generation.

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

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

[5] 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.

Uncontrolled VOC, HAP, and TAP emissions at the outlet of the Dry Hammermill baghouses (CD-HM-BH1 through BH8) were quantified based on results of the Sampson December 2019 compliance testing, process information, and appropriate contingencies based on engineering judgement. Controlled VOC, HAP, and TAP emissions were estimated based on a 95% destruction efficiency for the RTO (CD-RTO). NO_x and CO emissions resulting from thermal oxidation of VOC in the Dry Hammermill exhaust were calculated using emission factors from AP-42 Section 1.4, *Natural Gas Combustion*[6], and the maximum high heating value of the anticipated VOC constituents.

Emissions of criteria pollutants, HAP, and TAP from natural gas and propane combustion by the RTO, both as burner fuel and direct gas injection[7], were estimated using emission factors from AP-42 Section 1.4, *Natural Gas Combustion*, and AP-42 Section 1.5, *Liquefied Petroleum Gas Combustion*[8]. GHG emissions were calculated using emission factors for natural gas and propane combustion from Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials from Table A-1.

4.3 Pellet Mills and Pellet Coolers (ES-CLR-1 through ES-CLR-6)

Pellet Mills and Pellet Cooler operations generate particulate matter, VOC, HAP, and TAP emissions during the forming and cooling of wood pellets. The twelve (12) Pellet Mills and six (6) Coolers are equipped with six (6) simple cyclones (CD-CLR-1 through CD-CLR-6) which will exhaust through the proposed quench duct and RTO/RCO (CD-RCO) for VOC and HAP control. PM, PM_{10}, and $PM_{2.5}$ emissions from the Pellet Mills and Pellet Coolers were calculated based on results of the Sampson December 2019 compliance testing, process information, and an appropriate contingency based on engineering judgement.

Uncontrolled VOC, HAP, and TAP emissions at the outlet of the Pellet Cooler Cyclones were quantified based on results of the Sampson December 2019 compliance testing, process information, and an appropriate contingency based on engineering judgement. This includes emissions from both the Pellet Mills and the Pellet Coolers. Controlled VOC, HAP and TAP emissions were conservatively based on a 95% control efficiency for the RCO/RTO. NO_X and CO emissions resulting from thermal oxidation of VOC in the cyclone exhaust were calculated using AP-42 Section 1.4, *Natural Gas Combustion*[9], and the maximum high heating value of the anticipated VOC constituents.

Emissions of criteria pollutants, HAP, and TAP from natural gas and propane combustion by the RTO/RCO burners and direct gas injection were estimated using emission factors from AP-42 Section 1.4, *Natural Gas Combustion*, and AP-42 Section 1.5, *Liquefied Petroleum Gas Combustion.*[10,11] GHG emissions were calculated using emission factors for natural gas and propane combustion from Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials from Table A-1. Detailed potential emission calculations are provided in Appendix D.

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

[7] As previously described in Section 3, natural gas injection in an RTO is a way of reducing the amount of combustion air added to an RTO, thereby increasing fuel efficiency and reducing NOx generation.

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

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

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

[11] Natural gas injection in an RTO is a way of reducing the amount of combustion air added to an RTO, thereby increasing fuel efficiency and reducing NOx generation.

4.4 Dried Wood Handling Operations (ES-DWH)

Dried Wood Handling Operations (ES-DWH) include conveyor transfer points located between the Dryer and Dry Hammermills. Emissions from these transfers are routed through one of two (2) baghouses (CD-DWH-BH-1 and BH-2). PM, PM_{10} and $PM_{2.5}$ emissions from each baghouse were calculated based on the exhaust flow rate and exit grain loading. VOC, HAP, and TAP emissions were estimated based on emission factors derived from the Sampson December 2019 compliance test and include an appropriate contingency based on engineering judgement. Detailed potential emission calculations are provided in Appendix D.

4.5 Furnace and Dryer Bypass - Idle Mode (ES-F/DBYPASS)

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 10 MMBtu/hr. During this time, emissions from fuel combustion in the furnace exhaust out of the furnace and dryer bypass stacks. Emissions are vented predominately through the furnace bypass stack with the exception of approximately 10 minutes per event during transition from the Furnace Bypass Stack to the WESP and RTO. Emissions during these brief transition periods are insignificant and are not separately quantified to avoid double-counting, as they are fully accounted for under the 500 hours per year of furnace bypass. Potential emissions of CO, NO_X, SO_2, VOC, and HAP were calculated based on emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*.[12] GHG emissions were calculated based on emission factors for biomass combustion from Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials from Table A-1. Detailed potential emission calculations are included in Table 4b of Appendix D.

4.6 Furnace and Dryer Bypass – Cold Start-up (ES-F/DBYPASS)

Potential emissions of CO, NO_X, SO_2, PM, VOC and HAP for furnace and dryer bypass conditions were calculated based on emission factors from AP-42 Section 1.6, *Wood Residue Combustion in Boilers*.[13] GHG emissions were calculated based on emission factors for biomass combustion from Tables C-1 and C-2 of 40 Code of Federal Regulations (CFR) Part 98 and global warming potentials from Table A-1. Emissions were based on 15% of the maximum heat input capacity of the furnace (15% of 250.4 MMBtu/hr) and 50 hours per year of operation. As previously described in Section 3, during cold start-ups emissions may be released through the dryer bypass stack for approximately 10 minutes during transition from the furnace bypass stack to the WESP and RTO. Emissions during these brief transition periods are insignificant and are not separately quantified to avoid double-counting, as they are fully accounted for under the 50 hours per year of furnace bypass. Emissions from diesel combustion during cold start-ups are insignificant and were not explicitly quantified. Detailed potential emission calculations are included in Table 4a of Appendix D.

4.7 Double Duct Burners (IES-DDB-1 and IES-DDB-2)

CO, NO_X, SO_2, PM, VOC, and HAP Emissions from natural gas and propane combustion by the double duct burners (IES-DDB-1 through IES-DDB-4) were calculated based on AP-42 Section 1.4, *Natural Gas Combustion*[14], AP-42 Section 1.5, *Liquefied Petroleum Gas Combustion*[15], and emission factors from the South Coast Air Quality Management District's

[12] U.S. EPA. AP-42 Section 1.5, *Liquefied Petroleum Gas Combustion,* (07/08).

[13] U.S. EPA. AP-42 Section 1.6 *Wood Residue Combustion in Boilers,* (09/03).

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

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

(SCAQMD) Air Emissions Reporting (AER) Tool.[16] Detailed emission calculations are included in Appendix D.

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

4.8 Pellet Loadout Bins (ES-PB1 through 4), Finished Product Handling (ES-FPH), and Pellet Mill Loadouts (ES-PL-1 and 2)

PM emissions occur during transfer of finished product to the Pellet Loadout Bins and during transfer of pellets from the bins to trucks. PM emissions from Finished Product Handling, the four (4) Pellet Loadout Bins, and the two (2) truck loadout spouts are all controlled by a single baghouse (CD-FPH-BH). Potential PM emissions from the baghouse were calculated based on a maximum exit grain loading rate and the maximum nominal exhaust flow rate of the baghouse. As discussed in Section 2, the fraction of PM that is $PM_{2.5}$ has been updated from 0.35% to 40% based on a review of NCASI particle size distribution data for similar baghouses used in the wood products industry. Detailed potential emissions calculations are provided in Appendix D.

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

ATTACHMENT 2
UPDATED APPLICATION FORMS

FORMs A2, A3

EMISSION SOURCE LISTING FOR THIS APPLICATION - A2

112r APPLICABILITY INFORMATION - A3

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

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

EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	CONTROL DEVICE ID NO.	CONTROL DEVICE DESCRIPTION
Equipment To Be ADDED By This Application (New, Previously Unpermitted, or Replacement)			
IES-DDB-1 and 2	**Double Duct Burners**	**N/A**	
Existing Permitted Equipment To Be MODIFIED By This Application			
ES-Dryer	**250.4 MMBtu/hr wood-fired direct heat drying system**	**CD-WESP**	**Wet Electrostatic Precipitator**
		CD-RTO	**Regenerative Thermal Oxidation**
ES- GHM-1 through 3	**Three (3) Green Hammermills**	**CD-WESP**	**Wet Electrostatic Precipitator**
		CD-RTO	**Regenerative Thermal Oxidation**
ES-HM-1 through 8	**Eight (8) Dry Hammermills**	**CD-HM-BH-1 to 8**	**Baghouses**
		CD-WESP	**Wet Electrostatic Precipitator**
		CD-RTO	**Regenerative Thermal Oxidation**
ES-CLR-1 through 6	**Twelve (12) Pellet Mills and Six (6) Pellet Coolers**	**CD-CLR-1**	**Simple cyclone**
		CD-CLR-2	**Simple cyclone**
		CD-CLR-3	**Simple cyclone**
		CD-CLR-4	**Simple cyclone**
		CD-CLR-5	**Simple cyclone**
		CD-CLR-6	**Simple cyclone**
		CD-RCO (new)	**Regenerative Thermal Oxidation / Regenerative Catalytic Oxidation**
ES-F/DBYPASS	**Furnace/Dryer Bypass**	**N/A**	
ES-DWH	**Dried Wood Handling Operations**	**CD-DWH-BH-1 and 2**	**Baghouses**
ES-FPH	**Finished Product Handling**	**CD-FPH-BH**	**Baghouse**
ES-PB-1 through 4	**Four (4) Pellet Loadout Bins**		
ES-PL-1 and 2	**Two (2) Pellet Loadouts**		
Equipment To Be DELETED By This Application			

112(r) APPLICABILITY INFORMATION **A 3**

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

If No, please specify in detail how your facility avoided applicability: **The Sampson plant does not store any regulated substances in excess of their respective threshold quantities, as determined under §68.115.**

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

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

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

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

☐ Yes ☐ No If yes, please specify: _____

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

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

Attach Additional Sheets As Necessary

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

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Wood-fired Dryer, Green Hammermills, and Dry Hammermills	ES-Dryer & ES-GHM-1 to 3	PM	15A NCAC 02D .0515	RTO	Daily monitoring of WESP secondary voltage and current. Inspections and maintenance as recommended by the control device manufacturers, as well as monthly visual inspection of the ductwork and material collection units. Annual inspections of WESP including, but not limited to, visual check of critical components, checks for any equipment that does not alarm when de-energized, checks for signs of plugging in the hopper and gas distribution equipment, and replacement of broken equipment as required. Annual inspection of the heat transfer medium and associated inlet/outlet valves on the RTO. Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	Written or electronic log of WESP secondary voltage and current, date/time/result of inspections and maintenances, results of each inspections, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the WESP or RTO within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		VOC, CO, NO_x, $PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0317		Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ). Maintain 3-hour average firebox temperature for each of the two fireboxes comprising the RTO at or above the minimum average temperatures established in the most recent performance test. Daily monitoring of minimum secondary voltage and secondary current for the WESP. Limit throughput to 657,000 ODT per consecutive 12-month period. Perform required inspections and maintenance for the WESP and RTO (see above).	Written or electronic log of monthly throughput, hardwood/softwood mix, actual emissions (facility-wide 12-month rolling basis), 3-hour rolling average firebox temperatures for each firebox comprising the RTO, daily WESP secondary voltage and current, date/time/result of inspections and maintenances, results of each inspections, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the WESP or RTO within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements. Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		SO_2	15A NCAC 02D .0516		None required because inherently low sulfur content of wood fuel ensures compliance		
		HAP	15A NCAC 02Q .0308(a)		Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	N/A	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4).
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Pellet Mill Feed Silo	ES-PMFS	$PM/PM_{10}/PM_{2.5}$	15A NCAC 02D .0515	Baghouse	Inspections and maintenance, including monthly inspection of ductwork and material collection unit for leaks, and annual internal inspection of control device/baghouse integrity.	Written or electronic log of date and time of each inspection, results of inspection and maintenance, and variance from manufacturer's recommendation.	Any maintenance performed on the cyclones/baghouses within 30 days of a written request by DAQ. Semi-annual progress report and annual compliance certification.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Semi-annual progress report and annual compliance certification.
Pellet Fines Bin & Hammermill Area	ES-PFB & ES-HMA	$PM/PM_{10}/PM_{2.5}$	15A NCAC 02D .0515	Baghouse	Inspections and maintenance, including monthly inspection of ductwork and material collection unit for leaks, and annual internal inspection of control device/bagfilter integrity.	Written or electronic log of date and time of each inspection, results of inspection and maintenance, and variance from manufacturer's recommendation.	Any maintenance performed on the cyclones/baghouses within 30 days of a written request by DAQ. Semi-annual progress report and annual compliance certification.
		HAPs	Section 112(g) Case-by-Case MACT		Use of PM control technologies and maintenance of equipment in accordance with manufacturer's specifications and/or standard industry practices.	N/A	N/A
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Semi-annual progress report and annual compliance certification.

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

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Finished Product Handling	ES-FPH, ES-PB-1 to -4, ES-PL-1 to -2	PM	15A NCAC 02D .0515	Baghouse	Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of baghouse structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit results of any maintenance performed on the baghouse within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		$PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0308(a)		Monthly actual emissions.	Written or electronic log of actual emissions (facility-wide 12-month rolling basis).	Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
Pellet Mills and Coolers	ES-CLR-1 to -6	PM	15A NCAC 02D .0515	RTO/RCO	Inspections and maintenance as recommended by the RTO/RCO manufacturer, as well as monthly visual inspection of the ductwork and material collection units. Annual inspection of the heat transfer medium and associated inlet/outlet valves on the RTO. Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	Written or electronic log of date/time/result of inspections and maintenances, results of each inspections, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the baghouse within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		VOC, CO, NO_x, $PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0317		Initial and periodic stack testing for VOC and $PM/PM_{10}/PM_{2.5}$ (at least annually unless a longer duration is approved by DAQ). Limit pellet production to 657,000 ODT per consecutive 12-month period. Continuously monitor and record the temperature of the combustion chamber and maintain temperature at or above the temperature range established during the performance test. Perform periodic catalyst activity checks as recommended by the RCO manufacturer. At a minimum, perform annual internal inspection of the primary heat exchanger and associated inlet/outlet valves of the control device to ensure structural integrity.	Written or electronic log of monthly throughput, hardwood/softwood mix, and actual emissions (facility-wide 12-month rolling basis). Written or electronic log of date/time/result of inspections and maintenances, results of each inspections, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the cyclones and RTO/RCO within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements. Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		HAP	15A NCAC 02Q .0308(a)		Initial and periodic stack testing (at least annually unless a longer duration is approved by DAQ).	N/A	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4).
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.

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

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Pellet Cooler Recirculation	ES-PCR	$PM/PM_{10}/PM_{2.5}$	15A NCAC 02D .0515	Baghouse	Inspections and maintenance, including monthly inspection of ductwork and material collection unit for leaks, and annual internal inspection of control device/baghouse integrity.	Written or electronic log of date and time of each inspection, results of inspection and maintenance, and variance from manufacturer's recommendation.	Any maintenance performed on the cyclones/baghouses within 30 days of a written request by DAQ. Semi-annual progress report and annual compliance certification.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Semi-annual progress report and annual compliance certification.
Pellet Sampling Transfer Bin	ES-PSTB	$PM/PM_{10}/PM_{2.5}$	15A NCAC 02D .0515	Baghouse	Inspections and maintenance, including monthly inspection of ductwork and material collection unit for leaks, and annual internal inspection of control device/baghouse integrity.	Written or electronic log of date and time of each inspection, results of inspection and maintenance, and variance from manufacturer's recommendation.	Any maintenance performed on the cyclones/baghouses within 30 days of a written request by DAQ. Semi-annual progress report and annual compliance certification.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Semi-annual progress report and annual compliance certification.
Hammermill Conveyor	ES-HMC-1	$PM/PM_{10}/PM_{2.5}$	15A NCAC 02D .0515	Bin vent filter	Inspections and maintenance, including monthly inspection of ductwork and material collection unit for leaks, and annual internal inspection of control device/baghouse integrity.	Written or electronic log of date and time of each inspection, results of inspection and maintenance, and variance from manufacturer's recommendation.	Any maintenance performed on the cyclones/baghouses within 30 days of a written request by DAQ. Semi-annual progress report and annual compliance certification.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Semi-annual progress report and annual compliance certification.
Dried Wood Handling	ES-DWH	PM	15A NCAC 02D .0515	Baghouses	Initial stack testing. Inspections and maintenance as recommended by the manufacturer as well as monthly visual inspections of the system ductwork and material collection units for leaks, annual internal inspection of baghouse structural integrity.	Written or electronic log of date/time/result of inspection and maintenance, results of each inspection, results of maintenance on control devices, any variance from manufacturers' recommendations, if any, and corrections made.	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Submit results of any maintenance performed on the baghouse within 30 days of a written request by DAQ. Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.
		VOC	15A NCAC 02Q .0317		Initial stack testing (completed).	Written or electronic log of actual criteria pollutant emissions (facility-wide 12-month rolling basis).	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4). Make log of facility-wide 12-month rolling actual emissions for criteria pollutants available to DAQ upon request.
		HAP	15A NCAC 02Q .0308(a)		Initial stack testing.	N/A	Submit written report of test results not later than 30 days after sample collection, unless an extension is granted by DAQ under 15A NCAC 02D .2602(f)(4).
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.

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

Emission Source Description	ID No.	Pollutant	Regulation	Final Control Device	Monitoring Method/Frequency/Duration	Recordkeeping	Reporting
Emergency Generator	IES-ES	PM, CO, NO_x, NMHC, SO_2	40 CFR Part 60 Subpart IIII	N/A	All requirement are outlined in the regulation, including the following: use certified emergency engines, operate according to manufacturers procedures, use fuel oil with fuel content of no more than 15 ppmw sulfur and cetane index of at least 40, install non-resettable hour meter.	Maintain records of engine certification, fuel certifications and hours/year of operate of each engine.	Annual Compliance Certification
		SO_2	15A NCAC 02D .0516	N/A	Non required because inherently low sulfur content of fuel achieves compliance		
		Opacity	15A NCAC 02D .0521	N/A	N/A	N/A	N/A
		HAPs	40 CFR Part 63 Subpart ZZZZ	N/A	Comply with the NSPS requirements above and no other requirements apply.	Comply with the NSPS requirements above and no other requirements apply.	Annual Compliance Certification
Fire Water Pump	IES-FWP	PM, CO, NO_x, NMHC, SO_2	40 CFR Part 60 Subpart IIII	N/A	All requirement are outlined in the regulation, including the following: use certified emergency engines, operate according to manufacturers procedures, use fuel oil with fuel content of no more than 15 ppmw sulfur and cetane index of at least 40, install non-resettable hour meter.	Maintain records of engine certification, fuel certifications and hours/year of operate of each engine.	Annual Compliance Certification
		SO_2	15A NCAC 02D .0516	N/A	Non required because inherently low sulfur content of fuel achieves compliance		
		Opacity	15A NCAC 02D .0521	N/A	N/A	N/A	N/A
		HAPs	40 CFR Part 63 Subpart ZZZZ	N/A	Comply with the NSPS requirements above and no other requirements apply.	Comply with the NSPS requirements above and no other requirements apply.	Annual Compliance Certification
Furnace and Dryer Bypass	ES-F/DBYPASS	PM	15A NCAC 02D .0515	N/A	Comply with the process weight limitation.	N/A	N/A
		VOC, CO, NO_x, $PM/PM_{10}/PM_{2.5}$	15A NCAC 02Q .0317		Limit use of the bypass stacks to 50 per year for cold start-ups. Limit heat input during cold start-up to no more than 37.6 MMBtu/hr. Limit duration of cold start-up to 8 hours or less. Limit hours of operation in idle mode to 500 hours per year. Limit heat input during idle to 10 MMBtu/hr.	Written or electronic log of monthly hours operation in cold start-up and idle mode and actual emissions (facility-wide 12-month rolling basis).	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements. Make log of facility-wide 12-month rolling actual emissions available to DAQ upon request.
		Opacity	15A NCAC 02D .0521		Monthly visible observation for "normal". If above normal, take corrective action or Method 9 observation required.	Written or electronic log of date/time/result of each observation, results of each non-compliant observation and actions taken to correct, and results of corrective action.	Submit summary report of monitoring and recordkeeping activities semi-annually (on or before Jan 30th and July 30th). Identify all instances of deviations from permit requirements.

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

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

EMISSION SOURCE DESCRIPTION: **Furnace/Dryer Bypass**	EMISSION SOURCE ID NO: **ES-F/DBYPASS**
	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO __1_____ OF ___1_____	EMISSION POINT (STACK) ID NO(S): **EP-28**

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

Bypass stacks following the furnace and dryer (ES-F/DBYPASS) are used to exhaust hot gases during startup, shutdown, and malfunctions and during periods of furnace "idle mode" (defined as furnace heat input up to 10 MMBtu/hr). Use of the bypass stack during a cold start-up begins with the establishment of a flame in the fuel bed in the furnace and ends at the point the furnace temperature reaches 600°F and emissions are routed to the dryer for control by the WESP and RTO, with total start-up time not to exceed 12 hours for each cold start-up. Emissions are vented through the dryer bypass stack for approximately 10 minutes as exhaust flow is transitioned from the furnace bypass stack to the WESP and RTO. The purpose of operation in "idle mode" is to maintain the temperature of the fire brick lining the furnace which may be damaged if it cools too rapidly. Operation in "idle mode" also significantly reduces the amount of time required to restart the furnace. The furnace may operate up to 500 hr/yr in "idle mode" and may remain in an idle state for up to 24 consecutive hours.

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

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

START CONSTRUCTION DATE: **2016**	DATE MANUFACTURED:
MANUFACTURER / MODEL NO.: **Teal Sales Inc. 24' x 80' Single Pass Drum Dryer**	EXPECTED OP. SCHEDULE: **_24__** HR/DAY **_7___** DAY/WK **_52__** WK/YR **(normal o**
IS THIS SOURCE SUBJECT TO? ☐ NSPS (SUBPARTS?):_____	☐ NESHAP (SUBPARTS?):_____

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

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

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

See Emission Calculations in Appendix D

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

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

See Emission Calculations in Appendix D

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

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

See Emission Calculations in Appendix D

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

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

Attach Additional Sheets As Necessary

FORM B1

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

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

EMISSION SOURCE DESCRIPTION: **Furnace/Dryer Bypass**	EMISSION SOURCE ID NO: **ES-F/DBYPASS**
	CONTROL DEVICE ID NO(S): **N/A**
OPERATING SCENARIO: 1 OF 1	EMISSION POINT (STACK) ID NO(S): **EP-28**

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

HEATING MECHANISM: ☐ INDIRECT ☑ DIRECT

MAX. FIRING RATE (MMBTU/HOUR): **37.6 (cold start-up), 10 MMBtu/hr (idle mode)**

WOOD-FIRED BURNER

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

PERCENT MOISTURE OF FUEL: **20 to 50%**

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

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

COAL-FIRED BURNER

TYPE OF BOILER IF OTHER DESCRIBE:

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

OIL/GAS-FIRED BURNER

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL

TYPE OF FIRING: ☐ NORMAL ☐ TANGENTIAL ☐ LOW NOX BURNERS ☐ NO LOW NOX BURNER

OTHER FUEL-FIRED BURNER

TYPE(S) OF FUEL: _____

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL

TYPE OF FIRING: _____ TYPE(S) OF CONTROL(S) (IF ANY): _____

FUEL USAGE (INCLUDE STARTUP/BACKUP FUELS)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)
Cold Start-up: Bark/Wet Wood	**tons**	**30**	**4.00**
Furnace Idle: Bark/Wet Wood	**tons**	**30**	**1.00**

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

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

SAMPLING PORTS, COMPLIANT WITH EPA METHOD 1 WILL BE INSTALLED ON THE STACKS ☑ YES ☐ ☐ NO

COMMENTS:

Attach Additional Sheets As Necessary

ATTACHMENT 3
PROCESS FLOW DIAGRAM

Figure 2. Process Flow Diagram
Enviva Pellets Sampson, LLC – Sampson County, NC