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NCDENR

North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

November 17, 2014

Mr. Norb Hintz
Senior Vice President and Chief Engineer
Enviva Pellets Sampson, LLC
7200 Wisconsin Avenue, Suite 1000
Bethesda, Maryland 20814

Dear Mr. Hintz:

SUBJECT: Air Quality Permit No. 10386R00
Facility ID: 8200152
Enviva Pellets Sampson, LLC
Faison, North Carolina
Sampson County
PSD Status: Major
Fee Class: Title V

In accordance with your completed Air Quality Permit Application for a new permit for a Greenfield facility received September 3, 2014, we are forwarding herewith Air Quality Permit No. 10386R00 to Enviva Pellets Sampson, LLC, 5 Connector Road, Faison, North Carolina, authorizing the construction and operation, of the emission source(s) and associated air pollution control device(s) specified herein. Additionally, any emissions activities determined from your Air Quality Permit Application as being insignificant per 15A North Carolina Administrative Code 2Q .0503(8) have been listed for informational purposes as an "ATTACHMENT."

As the designated responsible official it is your responsibility to review, understand, and abide by all of the terms and conditions of the attached permit. It is also your responsibility to ensure that any person who operates any emission source and associated air pollution control device subject to any term or condition of the attached permit reviews, understands, and abides by the condition(s) of the attached permit that are applicable to that particular emission source.

The Permittee shall file a Title V Air Quality Permit Application pursuant to 15A NCAC 2Q .0504 on or before 12 months after commencing operation.

If any parts, requirements, or limitations contained in this Air Quality Permit are unacceptable to you, you have the right to request a formal adjudicatory hearing within 30 days following receipt of this permit, identifying the specific issues to be contested. This hearing request must be in the form of a written petition, conforming to NCGS (North Carolina General Statutes) 150B-23, and filed with both the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714 and the Division of Air Quality, Permitting Section, 1641 Mail Service Center, Raleigh, North Carolina 27699-1641. The form for requesting a formal adjudicatory hearing may be obtained upon request from the Office of Administrative Hearings. Please note that this permit will be stayed in its entirety upon receipt of the request for a hearing Unless a request for a hearing is made pursuant to NCGS 150B-23, this Air Quality Permit shall be final and binding 30 days after issuance.

You may request modification of your Air Quality Permit through informal means pursuant to NCGS 150B-22. This request must be submitted in writing to the Director and must identify the specific provisions or issues for which the modification is sought. Please note that this Air Quality Permit will become final and binding regardless of a request for informal modification unless a request for a hearing is also made under NCGS 150B-23.

The construction of new air pollution emission source(s) and associated air pollution control device(s), or modifications to the emission source(s) and air pollution control device(s) described in this permit must be covered under an Air Quality Permit issued by the Division of Air Quality prior to construction unless the Permittee has fulfilled the requirements of GS 143-215-108A(b) and received written approval from the Director of the Division of Air Quality to commence construction. Failure to receive an Air Quality Permit or written approval prior to commencing construction is a violation of GS 143-215.108A and may subject the Permittee to civil or criminal penalties as described in GS 143-215.114A and 143-215.114B.

For PSD increment tracking purposes in Sampson County, NOx (as NO_2) emissions are increased by 50.08 pounds per hour, PM-10 emissions are increased by 21.70 pounds per hour, and PM-2.5 emissions are increased by 13.33 pounds per hour.

This Air Quality Permit shall be effective from November 17, 2014 until October 31, 2019, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein. Should you have any questions concerning this matter, please contact Kevin Godwin at (919) 707-8480.

Sincerely yours,

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

c: EPA Region 4
Steven Vozzo, Supervisor, Fayetteville Regional Office
Shannon Vogel, Stationary Source Compliance Branch
Central Files
Connie Horne, Cover letter only

ATTACHMENT

Insignificant Activities per 15A NCAC 2Q .0503(8)

Emission Source ID No.	Emission Source Description
IES-GWHS	Green wood handling and sizing operations
IES-DWHS	Dried wood handling and sizing operations
IES-TK-1	Diesel fuel storage tank (up to 2,500 gallons capacity)
IES-TK-2	Diesel fuel storage tank (up to 1,000 gallons capacity)
IES-TK-3	Diesel fuel storage tank (up to 2,500 gallons capacity)
IES-GWSP-1 and 2	Green wood storage piles
IES-DEBARK-1	De-barker
IES-GWFB	Green wood fuel bin

1. Because an activity is insignificant does not mean that the activity is exempted from an applicable requirement or that the owner or operator of the source is exempted from demonstrating compliance with any applicable requirement.
2. When applicable, emissions from stationary source activities identified above shall be included in determining compliance with the permit requirements for toxic air pollutants under 15A NCAC 2D .1100 "Control of Toxic Air Pollutants" or 2Q .0711 "Emission Rates Requiring a Permit".
3. For additional information regarding the applicability of GACT see the DAQ page titled "The Regulatory Guide for Insignificant Activities/Permits Exempt Activities". The link to this site is as follows: http://daq.state.nc.us/permits/insig/

State of North Carolina,
Department of Environment,
and Natural Resources

Division of Air Quality

AIR QUALITY PERMIT

Permit No.	Replaces Permit No.(s)	Effective Date	Expiration Date
10386R00	N/A	November 17, 2014	October 31, 2019

Until such time as this permit expires or is modified or revoked, the below named Permittee is permitted to construct and operate the emission source(s) and associated air pollution control device(s) specified herein, in accordance with the terms, conditions, and limitations within this permit. This permit is issued under the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and Title 15A North Carolina Administrative Codes (15A NCAC), Subchapters 2D and 2Q, and other applicable Laws.

Pursuant to Title 15A NCAC, Subchapter 2Q, the Permittee shall not construct, operate, or modify any emission source(s) or air pollution control device(s) without having first submitted a complete Air Quality Permit Application to the permitting authority and received an Air Quality Permit, except as provided in this permit.

Permittee:	**Enviva Pellets Sampson, LLC**
Facility ID:	**8200152**
Facility Site Location: **City, County, State, Zip:**	**5 Connector Road** **Faison, Sampson County, North Carolina, 28341**
Mailing Address: **City, State, Zip:**	**7200 Wisconsin Avenue** **Bethesda, Maryland 20814**
Application Number: **Complete Application Date:**	**8200152.14B** **September 3, 2014**
Primary SIC Code:	**2499**
Division of Air Quality, **Regional Office Address:**	**Fayetteville Regional Office** **Systel Building** **225 Green Street, Suite 714** **Fayetteville, North Carolina, 28301**

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SECTION 1- PERMITTED EMISSION SOURCE (S) AND ASSOCIATED AIR POLLUTION CONTROL DEVICE (S) AND APPURTENANCES

The following table contains a summary of all permitted emission sources and associated air pollution control devices and appurtenances:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-CHIP-1 **PSD**	Log chipping	N/A	N/A
ES-GHM-1 and ES-GHM-2 **PSD**	Green wood hammermills	CD-GHM-BV-1 and CD-GHM-BV-2	Two bin vent filters (377 square feet of filter area each)
ES-BARKHOG **PSD**	Bark hog	N/A	N/A
ES-DRYER **PSD** **2D .1112 Case-by-case MACT**	Wood-fired direct heat drying system (250.4 million Btu per hour heat input)	CD-DC1, CD-DC2, CD-DC3, CD-DC4, and CD-WESP	Four simple cyclones (132 inches in diameter each) in series with one wet electrostatic precipitator (29,904 square feet of collector plate area)
ES-HM-1 through ES-HM-8 **PSD** **2D .1112 Case-by-case MACT**	Eight (8) hammermills	CD-HM-CYC-1 through CD-HM-CYC-8, and CD-HM-BF1 through CD-HM-BF8	Eight (8) simple cyclones (96 inches in diameter each) in series with eight (8) bagfilters (2,168 square feet of filter area each)
ES-HMA & ES-PFB **PSD** **2D .1112 Case-by-case MACT**	Hammermill area and Pellets fines bin	CD-PFB-BV	One bagfilter (1,520 square feet of filter area)
ES-PMFS **PSD**	Pellet mill feed silo	CD-PMFS-BV	One bin vent filter (377 square feet of filter area)
ES-CLR-1 through ES-CLR-6 **PSD** **2D .1112 Case-by-case MACT**	Six (6) pellet coolers	CD-CLR-1 through CD-CLR-6	Six (6) simple cyclones (54 inches in diameter) installed one each on the coolers

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-FPH, ES-PB-1 through ES-PB-4, ES-PL-1 and ES-PL-2 **PSD**	Finished product handling, four (4) pellet load-out bins, and two pellet mill loadouts	CD-FPH-BF	One bagfilter (4,842 square feet of filter area)
ES-GN **PSD** **MACT Subpart ZZZZ** **NSPS Subpart IIII**	Diesel-fired emergency generator (250 brake horsepower)	N/A	N/A
ES-FWP **PSD** **MACT Subpart ZZZZ** **NSPS Subpart IIII**	Diesel-fired fire emergency water pump (250 brake horsepower)	N/A	N/A

SECTION 2 - SPECIFIC LIMITATIONS AND CONDITIONS

2.1- Emission Source(s) and Control Devices(s) Specific Limitations and Conditions

The emission source(s) and associated air pollution control device(s) and appurtenances listed below are subject to the following specific terms, conditions, and limitations, including the testing, monitoring, recordkeeping, and reporting requirements as specified herein:

A. **Log Chipping (ID No. ES-CHIP-1), Bark Hog (ID No. ES-BARKHOG), Wood-fired direct heat drying system (ID No. ES-DRYER), Hammermills (ID Nos. ES-GHM-1 and GHM-2, ES-HM-1 through HM-8), Hammermill Area Filter (ID No. ES-HMA), Pellet Mill Feed Silo (ID No. ES-PMFS), Pellet Coolers (ID Nos. ES-CLR-1 through CLR-6), Pellets Fines Bin (ID No. ES-PFB), Finished Product Handling (ID No. ES-FPH), Pellet Load-out Bins (ID Nos. ES-PB-1 through PB-4), and Pellet Mill Load-out (ID No. ES-PL-1 and PL-2)**

The following table provides a summary of limits and standards for the emission source(s) described above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Particulate matter	$E = 4.10 \times P^{0.67}$ for P < 30 tph $E = 55 \times P^{0.11} - 40$ for P ≥ 30 tph where, E = allowable emission rate (lb/hr) P = process weight rate (tph)	15A NCAC 02D .0515
Sulfur dioxide	2.3 pounds per million Btu	15A NCAC 02D .0516
Visible emissions	20 percent opacity when averaged over a 6-minute period	15A NCAC 02D .0521
HAPS	See Section 2.1 A.4.	15A NCAC 02D .1112 [§ 112(g) Case-by-case MACT]
PM/PM-10/PM-2.5, NOx VOC CO GHG	BACT Limits, See Section 2.2 A.2.	15A NCAC 02D .0530

1. **15A NCAC 2D .0515: PARTICULATES FROM MISCELLANEOUS INDUSTRIAL PROCESSES**
   a. Emissions of particulate matter from these sources shall not exceed an allowable emission rate as calculated by the following equation: [15A NCAC 2D .0515(a)]

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

      Where E = allowable emission rate in pounds per hour
      P = process weight in tons per hour

      Liquid and gaseous fuels and combustion air are not considered as part of the process weight.

   Testing [15A NCAC 2Q .0308(a)]

   b. Under the provisions of NCGS 143-215.108, the Permittee shall test the wet electrostatic precipitator (ID No. CD-WESP) for total suspended particulate (TSP) in accordance with a testing protocol approved by the DAQ. Testing shall be completed and the results submitted within 180 days of commencement of operation unless an alternate date is approved by the DAQ.

   Monitoring/Recordkeeping [15A NCAC 2Q .0308(a)]

   c. The Permittee shall maintain production records such that the process rates "P" in tons per hour, as specified by the formulas contained above (or the formulas contained in 15A NCAC 2D .0515) can be derived, and shall make these records available to a DAQ authorized representative upon request.

   d. Particulate matter emissions from the wood-fired dryer (ID No. ES-DRYER) shall be controlled by four (4) cyclones (ID Nos. CD-DC-1 through DC-4) in series with one wet electrostatic precipitator (ID No. CD-WESP). Particulate matter emissions from the hammermills (ID Nos. ES-GHM-1 and 2, ES-HM-1 through 8) shall be controlled by bin vent filter, bagfilters and cyclones (ID Nos. CD-RCHP-BV-1 and 2, CD-HM-CYC-1 through 8, and CD-HM-BF-1 through 8). Particulate matter emissions from the hammermill area (ID No. ES-HMA) and the pellets fines bin (ID No. ES-PFB) shall be controlled by a bin vent filter (ID No. CD-PFB-BV). Particulate matter emissions from the pellet mill feed silo (ID No. ES-PMFS) shall be controlled by a bin vent filter (ID No. CD-PMFS-BV). Particulate matter emissions from the pellet coolers (ID Nos. ES-CLR-1 through 6) shall be controlled by cyclones (ID Nos. CD-CLR-1 through 6). Particulate matter emissions from finished product handling (ID No. ES-FPH), pellet mill load-out bins (ID Nos. ES-PB-1 through 4), and pellet mill load-out (ID No. ES-PL-1 and 2) shall be controlled by a bagfilter (ID No. CD-FPH-BF)

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

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

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

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

e. The results of inspection and maintenance shall be maintained in a log (written or electronic format) on-site and made available to an authorized representative upon request. The log shall record the following:
   i. the date and time of each recorded action;
   ii. the results of each inspection;
   iii. the results of any maintenance performed; and
   iv. any variance from manufacturer's recommendations, if any, and corrections made.

Reporting

f. The Permittee shall submit the results of any maintenance performed on the WESP, cyclones, bagfilters, and bin vent filters within 30 days of a written request by the DAQ.

2. 15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

a. Emissions of sulfur dioxide from these sources shall not exceed 2.3 pounds per million Btu heat input. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard. [15A NCAC 2D .0516]

Testing [15A NCAC 2Q .0308(a)]

b. If emissions testing is required, the testing shall be performed in accordance with General Condition JJ found in Section 3.

Monitoring/Recordkeeping/Reporting [15A NCAC 2Q .0308(a)]

c. No monitoring/recordkeeping/reporting is required for sulfur dioxide emissions from firing biomass in the dryer system.

3. **15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS**
   a. Visible emissions from these sources shall not be more than 20 percent opacity when averaged over a six-minute period. However, six-minute averaging periods may exceed 20 percent not more than once in any hour and not more than four times in any 24-hour period. In no event shall the six-minute average exceed 87 percent opacity. [15A NCAC 2D .0521 (d)]

   Testing [15A NCAC 2Q .0308(a)]

   b. If emissions testing is required, the testing shall be performed in accordance with General Condition JJ.

   Monitoring [15A NCAC 2Q .0308(a)]

   c. To assure compliance, once a month the Permittee shall observe the emission points of this source for any visible emissions above normal. The monthly observation must be made for each month of the calendar year period to ensure compliance with this requirement. The Permittee shall establish "normal" for the source in the first 30 days following the effective date of the permit. If visible emissions from this source are observed to be above normal, the Permittee shall either:
      i. take appropriate action to correct the above-normal emissions as soon as practicable and within the monitoring period and record the action taken as provided in the recordkeeping requirements below, or
      ii. demonstrate that the percent opacity from the emission points of the emission source in accordance with 15A NCAC 2D .2610 (Method 9) for 12 minutes is below the limit given in Section 2.1 A.3. a. above.

   Recordkeeping [15A NCAC 2Q .0308(a)]

   d. The results of the monitoring shall be maintained in a log (written or electronic format) on-site and made available to an authorized representative upon request. The log shall record the following:
      i. the date and time of each recorded action;
      ii. the results of each observation and/or test noting those sources with emissions that were observed to be in noncompliance along with any corrective actions taken to reduce visible emissions; and
      iii. the results of any corrective actions performed.

   Reporting [15A NCAC 2Q .0308(a)]

   e. No reporting is required.

4. **15A NCAC 02D .1112 National Emissions Standards for Hazardous Air Pollutants, 112(g) Case-by-Case Maximum Achievable Control Technology** – For the wood pellet mill dryer (ID No. ES-DRYER), the Permittee shall use a low HAP emitting dryer design not requiring add-on control.

   Testing [15A NCAC 2D .0530]

   a. Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall establish emission factors by conducting an intitial performance test on the dryer system for formaldehyde, methanol, acetaldehyde, and propionaldehyde utilizing EPA reference methods, as in effect on the date of permit issuance, contained in 40 CFR 60, Appendix A, or 40 CFR 63 AND in accordance with a testing protocol (using testing protocol submittal form) approved by the Division of Air Quality. The sum of the above HAPs will be multiplied by a correction factor of 1.04 to determine total HAPs for the dryer system.

   Initial testing shall be completed and the results submitted within 180 days of commencement of operation unless an alternate date is approved by the DAQ.

b. **Monitoring/Recordkeeping/Reporting** [15A NCAC 2Q .0308(a)]
No monitoring, recordkeeping, or reporting is required.

B. Emergency Generator (ID No. ES-GN) and Fire Water Pump (ID No. ES-FWP)

The following table provides a summary of limits and/or standards for the emission source(s) described above.

Regulated Pollutant	Limits/Standards	Applicable Regulation
Sulfur dioxide	2.3 pounds per million Btu heat input	15A NCAC 2D .0516
Visible emissions	20 percent opacity	15A NCAC 2D .0521
Hazardous air pollutants (HAP)	National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE) No additional requirements per 63.6590(c)	15A NCAC 2D .1111 (40 CFR 63, Subpart ZZZZ)
NMHC and NOx, CO, PM	0.20 g/kW for PM; 3.5 g/kW for CO; and 4 g/kW for NOx + NMHC	15A NCAC 2D .0524 (40 CFR 60, Subpart IIII)

1. 15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

a. Emissions of sulfur dioxide from these sources shall not exceed 2.3 pounds per million Btu heat input. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard. [15A NCAC 2D .0516]

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

b. If emissions testing is required, the testing shall be performed in accordance with 15A NCAC 2D .2600.

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

c. No monitoring/recordkeeping/reporting is required for sulfur dioxide emissions from the firing of diesel fuel in these sources.

2. 15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

a. Visible emissions from these sources shall not be more than 20 percent opacity when averaged over a six-minute period. However, six-minute averaging periods may exceed 20 percent not more than once in any hour and not more than four times in any 24-hour period. In no event shall the six-minute average exceed 87 percent opacity. [15A NCAC 2D .0521(d)]

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

b. If emissions testing is required, the testing shall be performed in accordance with 15A NCAC 2D .2600.

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

c. To assure compliance, once a month the Permittee shall observe the emission points of these sources for any visible emissions above normal. The monthly observation must be made for each month of the calendar year period to ensure compliance with this requirement. The Permittee shall establish 'normal' for the sources in the first 30 days following commencement of operation. If visible emissions from these sources are observed to be above normal, the Permittee shall either:
   i. take appropriate action to correct the above-normal emissions as soon as practicable and within the monitoring period and record the action taken as provided in the recordkeeping requirements below, or
   ii. demonstrate that the percent opacity from the emission points of the emission source in accordance with 15A NCAC 02D .2601 (Method 9) for 12 minutes is below the limit given in Section 2.1 F.2. a. above.

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

d. The results of the monitoring shall be maintained in a log (written or electronic format) on-site and made available to an authorized representative upon request. The log shall record the following:
   i. the date and time of each recorded action;
   ii. the results of each observation and/or test noting those sources with emissions that were observed to be in noncompliance along with any corrective actions taken to reduce visible emissions; and
   iii. the results of any corrective actions performed.

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

e. No reporting is required.

3. 15A NCAC 2D .0524 NEW SOURCE PERFORMANCE STANDARDS [40 CFR 60 Subpart IIII]

a. The provisions of this subpart are applicable to manufacturer, owners, and operators of stationary compression ignition (CI), reciprocating internal combustion engines (RICE). The Permittee shall comply with all applicable provisions, including the requirements for emission standards, notification, testing, reporting, recordkeeping, and monitoring, contained in Environmental Management Commission Standard 15A NCAC 2D .0524 "New Source Performance Standards (NSPS)" as promulgated in 40 CFR Part 60 Subpart IIII, including Subpart A "General Provisions."

Emission Standards

Emergency and Fire Pump Engines

b. Pursuant to 40 CFR §60.4205(b), owners and operators must comply with the following emission standards:

Pollutant	Emission Limit (g/kW-hr)	Emission Limit (g/bhp-hr)
CO	3.5	2.6
PM	0.2	0.15
NMHC + NOx	4.0	3.0

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

c. The Permittee shall operate the stationary ICE of emergency generators according to the requirements in paragraphs (f)(1) through (3) of §60.4211. In order for the engine to be considered an emergency stationary ICE under this Subpart, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in nonemergency situations for 50 hours per year, as described in paragraphs (f)(1) through (3) of §60.4211, is prohibited. If the Permittee does not operate the engine according to the requirements in paragraphs (f)(1) through (3) of §60.4211, the engine will not be considered an emergency engine under this Subpart and shall meet all requirements for non-emergency engines.
   i. There is no time limit on the use of emergency stationary ICE in emergency situations.
   ii. The Permittee may operate the emergency stationary ICE for any combination of the purposes specified in paragraphs (f)(2)(i) through (iii) of §60.4211 for a maximum of 100 hours per calendar year. Any operation for non-emergency situations as allowed by paragraph (f)(3) of §60.4211 counts as part of the 100 hours per calendar year allowed by this paragraph (f)(2).
      (A) Emergency stationary ICE may be operated for maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine. The Permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the Permittee maintains records indicating that federal, state, or local standards require maintenance and

testing of emergency ICE beyond 100 hours per calendar year.

(B) Emergency stationary ICE may be operated for emergency demand response for periods in which the Reliability Coordinator under the North American Electric Reliability Corporation (NERC) Reliability Standard EOP–002–3, Capacity and Energy Emergencies (incorporated by reference, see § 60.17), or other authorized entity as determined by the Reliability Coordinator, has declared an Energy Emergency Alert Level 2 as defined in the NERC Reliability Standard EOP–002–3.

(C) Emergency stationary ICE may be operated for periods where there is a deviation of voltage or frequency of 5 percent or greater below standard voltage or frequency.

iii. Emergency stationary ICE may be operated for up to 50 hours per calendar year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing and emergency demand response provided in paragraph (f)(2) of this section. Except as provided in paragraph (f)(3)(i) of §60.4211, the 50 hours per calendar year for nonemergency situations cannot be used for peak shaving or non-emergency demand response, or to generate income for a facility to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

(A) The 50 hours per year for non-emergency situations can be used to supply power as part of a financial arrangement with another entity if all of the following conditions are met:

(AA) The engine is dispatched by the local balancing authority or local transmission and distribution system operator.

(BB) The dispatch is intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads that could lead to the interruption of power supply in a local area or region.

(CC) The dispatch follows reliability, emergency operation or similar protocols that follow specific NERC, regional, state, public utility commission or local standards or guidelines.

(DD) The power is provided only to the facility itself or to support the local transmission and distribution system.

(EE) The owner or operator identifies and records the entity that dispatches the engine and the specific NERC, regional, state, public utility commission or local standards or guidelines that are being followed for dispatching the engine. The local balancing authority or local transmission and distribution system operator may keep these records on behalf of the engine owner or operator.

[§60.4211(f]

d. Pursuant to 40 CFR §60.4206, owners and operators must operate and maintain the stationary RICE according to the manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer, over the entire life of the engine.

Fuel Requirements for Owners and Operators

e. Pursuant to 40 CFR §60.4207, owners and operators must use fuel with a maximum sulfur content of 15 ppmw and a cetane index of at least 40.

f. Pursuant to 40 CFR §60.4209(a), the owner or operator must install a non-resettable hour meter prior to start-up of the engines.

Recordkeeping [15A NCAC 2Q .0308(a)]

g. Starting with the emergency engine model year 2011, if the emergency engine does not meet the standards applicable to non-emergency engines in the applicable model year, the Permittee shall keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. The Permittee shall record the time of operation of the engine and the reason the engine was in operation during that time. [§60.4214(b)]

4. **15A NCAC 2D .1111: MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY (40 CFR 63 Subpart ZZZZ)**
   a. Pursuant to §63.6580, Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

   b. Pursuant to §63.6590(c), a new emergency stationary RICE with a site rating of less than or equal to 500 horsepower located at a major source must meet the requirements of 40 CFR Part 60, Subpart IIII, for compression ignition engines. No further requirements apply for such engines under this part.

2.2- Multiple Emission Source(s) Specific Limitations and Conditions

A. Facility-wide Emission Sources

The following table provides a summary of limits and standards for the emission source(s) describe above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Fugitive dust	Minimize fugitive dust beyond property boundary	15A NCAC 02D .0540
PM/PM-10/PM-2.5, NOx, CO, VOC, and GHG	BACT Limits	15A NCAC 02D .0530

1. **Fugitive Dust Control Requirement** [15A NCAC 2D .0540] - STATE ENFORCEABLE ONLY
   As required by 15A NCAC 2D .0540 "Particulates from Fugitive Dust Emission Sources," the Permittee shall not cause or allow fugitive dust emissions to cause or contribute to substantive complaints or excess visible emissions beyond the property boundary. If substantive complaints or excessive fugitive dust emissions from the facility are observed beyond the property boundaries for six minutes in any one hour (using Reference Method 22 in 40 CFR, Appendix A), the owner or operator may be required to submit a fugitive dust plan as described in 2D .0540(f).

   "Fugitive dust emissions" means particulate matter from process operations 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).

2. **15A NCAC 2D .0530: PREVENTION OF SIGNIFICANT DETERIORATION**
   a. The Permittee shall comply with all applicable provisions, including the notification, testing, reporting, recordkeeping, and monitoring requirements in accordance with 15A NCAC 2D .0530, "Prevention of Significant Deterioration of Air Quality" as promulgated in 40 CFR 51.166. [15A NCAC 2D .0530]

   b. The following emission limits shall not be exceeded except during periods of start-up, shut-down, or malfunction. [15A NCAC 2D .0530]:

Unit	Pollutant	BACT Limit*	Units	Averaging Period	Technology
Dryer system	NOx PM PM10/2.5 CO VOC** GHG	0.20 0.105 (filterable only) 0.21 1.07 230,000	lb/MMBtu lb/ODT lb/MMBtu lb/ODT tpy (CO_2e)	3-hour 3-hour 3-hour 3-hour Annual	Good Combustion Practices/low NOx burners Cyclones/WESP Process Design Process Design Use of Biomass Fuel
Green Wood Hammermills	PM/PM10/2.5 VOC**	0.004 (filterable only) 0.27	gr/dscf lb/ODT	3-hour 3-hour	Bin vent filter Good operating and maintenance procedures
Dry Hammermills	PM/PM10/2.5 VOC**	0.004/0.004/0.000014 (filterable only) 0.24	gr/dscf lb/ODT	3-hour 3-hour	Cyclones & Bagfilter Process Design
Pellet Mill Feed Silo	PM/PM10/2.5	0.004 (filterable only)	gr/dscf	3-hour	Bin vent filter
Hammermill Area and Pellet Mill Fines Bin	PM/PM10/2.5	0.004 (filterable only)	gr/dscf	3-hour	Bin vent filter
Final Product Handling	PM/PM10/2.5	0.004/0.004/0.000014 (filterable only)	gr/dscf	3-hour	Bagfilter
Pellet Coolers	PM/PM10/2.5 VOC**	0.022/0.0057/0.0007 (filterable only) 0.85	gr/dscf lb/ODT	3-hour 3-hour	Cyclones Process Design
Log Bark Hog	VOC	N/A	N/A	N/A	Fugitive
Chipper	VOC	N/A	N/A	N/A	Fugitive
Green Wood Handling	PM/PM10/2.5	N/A	N/A	N/A	Inherent Moisture
Storage Piles	PM/PM10/2.5 VOC	N/A N/A	N/A N/A	N/A N/A	Inherent Moisture Fugitive
Road Dust	PM/PM10/2.5	N/A	N/A	N/A	Paving & Water Spray
Emergency engines	CO NMHC+NOx PM	2.6 3.0 0.15 (filterable only)	g/bhp-hr g/bhp-hr g/bhp-hr		Design and Good operating practices NSPS Certification
Storage tanks	VOC	Good Operation Practices	N/A	N/A	Good operating practices

* BACT emission limits shall apply at all times except the following: Emissions resulting from start-up, shutdown or malfunction above those given in Section 2.2 A.4. Table above are permitted provided that optimal operational practices are adhered to and periods of excess emissions are minimized.

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

Testing [15A NCAC 2D .0530]

c. Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the BACT emission limits by conducting performance test on the dryer system, the pellet coolers, and the greenwood hammermills as specified below utilizing EPA reference methods, as in effect on the date of permit issuance, contained in 40 CFR 60, Appendix A, 40 CFR 63, and/or OTM 26 AND in accordance with a testing protocol (using testing protocol submittal form) approved by the Division of Air Quality, as follows:

Unit	Pollutant	Testing
Dryer system	NOx	Annually
	PM/PM10/PM2.5	Annually
	VOC	Initial Only
	CO	Initial Only
One Pellet cooler	VOC	Initial Only
One Green wood hammermill	VOC	Initial Only

Initial testing shall be completed and the results submitted within 180 days of commencement of operation unless an alternate date is approved by the DAQ.

<u>Monitoring/Recordkeeping/Reporting</u> [15ANCAC 02Q .0308(a)]

d. The Permittee shall not process more than 537,625 oven-dried tons (ODT) of pellets per year. The Permittee shall not process more than 75% softwood on a 12-month rolling average basis. The process rate and hardwood/softwood mix shall be recorded in a monthly log kept on site. Calculations and the total amount of NOx, filterable PM, CO, and VOC emissions shall be recorded monthly in a log (written or electronic format) kept on site and made available to DAQ personnel upon request.

e. For the dryer system, GHG (CO_2e) emissions shall be calculated on a monthly basis and compliance demonstrated using the applicable Part 98 emission factors. Compliance shall be documented on a 12 month rolling basis.

f. No reporting is required.

g. <u>REPORTING REQUIREMENT</u> – Within 30 days of beginning commercial operation, the Permittee shall notify, in writing, the Regional Office of the date the facility began commercial operation. Pursuant to 15A NCAC 2Q .0500 the Permittee shall have one year from the date of beginning commercial operation to submit a complete Title V application to the Regional Supervisor.

SECTION 3 - GENERAL CONDITIONS

1. <u>REPORTS, TEST DATA, MONITORING DATA, NOTIFICATIONS, AND REQUESTS FOR RENEWAL</u> shall be submitted to:

   Patrick Butler
   Regional Air Quality Supervisor
   North Carolina Division of Air Quality
   Raleigh Regional Office
   3800 Barrett Drive
   Raleigh, NC 27609
   (919) 791-4200

2. <u>PERMIT RENEWAL REQUIREMENT</u> - The Permittee, at least 90 days prior to the expiration date of this permit, shall request permit renewal by letter in accordance with 15A NCAC 2Q .0304(d) and (f). Pursuant

to 15A NCAC 2Q .0203(i), no permit application fee is required for renewal of an existing air permit. The renewal request should be submitted to the Regional Supervisor, DAQ.

3. ANNUAL FEE PAYMENT - Pursuant to 15A NCAC 2Q .0203(a), the Permittee shall pay the annual permit fee within 30 days of being billed by the DAQ. Failure to pay the fee in a timely manner will cause the DAQ to initiate action to revoke the permit.

4. ANNUAL EMISSION INVENTORY REQUIREMENTS – The Permittee shall report by June 30 of each year the actual emissions of each air pollutant listed in 15A NCAC 02Q .0207(a) from each emission source within the facility during the previous calendar year. The report shall be in or on such form as may be established by the Director. The accuracy of the report shall be certified by the responsible official of the facility.

5. EQUIPMENT RELOCATION - A new air permit shall be obtained by the Permittee prior to establishing, building, erecting, using, or operating the emission sources or air cleaning equipment at a site or location not specified in this permit.

6. This permit is subject to revocation or modification by the DAQ upon a determination that information contained in the application or presented in the support thereof is incorrect, conditions under which this permit was granted have changed, or violations of conditions contained in this permit have occurred. The facility shall be properly operated and maintained at all times in a manner that will effect an overall reduction in air pollution. Unless otherwise specified by this permit, no emission source may be operated without the concurrent operation of its associated air cleaning device(s) and appurtenances.

7. REPORTING REQUIREMENT - Any of the following that would result in previously unpermitted, new, or increased emissions must be reported to the Regional Supervisor, DAQ:
   a. changes in the information submitted in the application regarding facility emissions;
   b. changes that modify equipment or processes of existing permitted facilities; or
   c. changes in the quantity or quality of materials processed.

   If appropriate, modifications to the permit may then be made by the DAQ to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause a violation of the emission limitations specified herein.

8. This permit is nontransferable by the Permittee. Future owners and operators must obtain a new air permit from the DAQ.

9. This issuance of this permit in no way absolves the Permittee of liability for any potential civil penalties which may be assessed for violations of State law which have occurred prior to the effective date of this permit.

10. This permit does not relieve the Permittee of the responsibility of complying with all applicable requirements of any Federal, State, or Local water quality or land quality control authority.

11. Reports on the operation and maintenance of the facility shall be submitted by the Permittee to the Regional Supervisor, DAQ at such intervals and in such form and detail as may be required by the DAQ. Information required in such reports may include, but is not limited to, process weight rates, firing rates, hours of operation, and preventive maintenance schedules.

12. A violation of any term or condition of this permit shall subject the Permittee to enforcement pursuant to G.S. 143-215.114A, 143-215.114B, and 143-215.114C, including assessment of civil and/or criminal penalties.

13. Pursuant to North Carolina General Statute 143-215.3(a)(2), no person shall refuse entry or access to any authorized representative of the DAQ who requests entry or access for purposes of inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper, or interfere with any such representative while in the process of carrying out his official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

14. The Permittee must comply with any applicable Federal, State, or Local requirements governing the handling, disposal, or incineration of hazardous, solid, or medical wastes, including the Resource Conservation and Recovery Act (RCRA) administered by the Division of Waste Management.

15. PERMIT RETENTION REQUIREMENT - The Permittee shall retain a current copy of the air permit at the site. The Permittee must make available to personnel of the DAQ, upon request, the current copy of the air permit for the site.

16. CLEAN AIR ACT SECTION 112(r) REQUIREMENTS - Pursuant to 40 CFR Part 68 "Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)," if the Permittee is required to develop and register a risk management plan pursuant to Section 112(r) of the Federal Clean Air Act, then the Permittee is required to register this plan in accordance with 40 CFR Part 68.

17. PREVENTION OF ACCIDENTAL RELEASES - GENERAL DUTY - Pursuant to Title I Part A Section 112(r)(1) of the Clean Air Act "Hazardous Air Pollutants - Prevention of Accidental Releases - Purpose and General Duty," although a risk management plan may not be required, if the Permittee produces, processes, handles, or stores any amount of a listed hazardous substance, the Permittee has a general duty to take such steps as are necessary to prevent the accidental release of such substance and to minimize the consequences of any release. This condition is federally-enforceable only.

Permit issued this the 17th day of November, 2014.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

William D. Willets, P.E., Chief, Permitting Section
Division of Air Quality, NCDENR
By Authority of the Environmental Management Commission

Air Permit No. 10386R00

NORTH CAROLINA
DIVISION OF AIR QUALITY

Application Review
Including
Final Determination

Permit Issue Date: November 17, 2014

Region: Fayetteville Regional Office
County: Sampson
NC Facility ID: 8200152
Inspector's Name:
Date of Last Inspection:
Compliance Code:

Facility Data

Applicant (Facility's Name): Enviva Pellets Sampson, LLC

Facility Address:
Enviva Pellets Sampson, LLC
5 Connector Road
Faison, NC 28341

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

Facility Classification: Before: N/A **After:** Title V
Fee Classification: Before: N/A **After:** Title V

Permit Applicability (this application only)

SIP: 15A NCAC 02D .0515, .0516, .0521
NSPS: Subpart IIII
NESHAP: Subpart ZZZZ, 112(g)
PSD: For VOC, CO, NOx, PM/PM10/2.5, and GHG
PSD Avoidance:
NC Toxics: N/A
112(r):
Other:

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Joe Harrell EHS Manager (252) 209-6032 142 NC Route 561 East Ahoskie, NC 27910	Norb Hintz Senior Vice President and Chief of Engineering (804) 929-8418 7200 Wisconsin Avenue Bethesda, MD 20814	Joe Harrell EHS Manager (252) 209-6032 142 NC Route 561 East Ahoskie, NC 27910

Application Data

Application Number: 8200152.14B
Date Received: 09/03/2014
Application Type: Greenfield Facility
Application Schedule: PSD

Existing Permit Data
Existing Permit Number: N/A
Existing Permit Issue Date: N/A
Existing Permit Expiration Date: N/A

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP

<No Inventory>

Review Engineer: Kevin Godwin

Review Engineer's Signature: Kevin T. Godwin **Date:** 11-17-14

Comments / Recommendations:
Issue 10386R00
Permit Issue Date: 11/17/2014
Permit Expiration Date: 10/31/2019

I. Introduction and Purpose of Application

A. Enviva Pellets Sampson, LLC is planning to construct and operate a wood pellets manufacturing plant in Sampson County. The proposed plant is designed to produce up to 537,625 oven-dried tons (ODT) of wood pellets per year utilizing up to 75% softwood on a 12-month rolling total basis.

B. The proposed plant will include the following emission sources:
1. Green wood handling and sizing operations;
2. Green wood fuel storage bin;

3. Log de-barker, bark hog, and log chipper;
4. Two (2) green wood hammermills controlled by bin vent filters;
5. Eight (8) dry wood hammermills controlled by eight cyclones and eight bagfilters;
6. Hammermill area emissions controlled by the pellet fines bin filter;
7. A pellet mill feed silo controlled by a bin vent filter;
8. Twelve (12) wood pellet presses and six (6) pellet coolers controlled by simple cyclones;
9. One 250.4 million Btu per hour green wood direct-fired dryer system controlled by four simple cyclones in series with a wet electrostatic precipitator (WESP);
10. Finished product storage and loading controlled by a bagfilter;
11. Pellet fines bin controlled by a bin vent filter;
12. Dried wood handling operations;
13. Three (3) diesel storage tanks;
14. Diesel-fired emergency generator and fire water pump.

C. The facility-wide potential to emit will be greater than Prevention of Significant Deterioration (PSD) major stationary source level for VOC. The PSD significance levels will be exceeded for PM, PM-10, PM-2.5, CO NOx, and GHG. Therefore, PSD review is required for these regulated NSR pollutants.

II. Regulatory Summary – Specific Emission Source Limitations

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 equation:

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

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

According to the application, the most significant source of PM emissions is the dryer system operating at 71.71 ODT/hr. The allowable emission rate is calculated to be 48 lb/hr. Maximum PM emission rate estimate is provided by the dryer vendor. The maximum hourly emission rate is 12 lb/hr. Therefore, compliance is indicated.

DAQ Cyclone Design Evaluation spreadsheet is used to verify proper design to yield expected control device efficiencies.

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

Control Device Monitoring

For cyclones:
To assure compliance, the Permittee shall perform inspections and maintenance as recommended by the manufacturer. In addition to the manufacturer's inspection and maintenance recommendations, or if there is no manufacturer's inspection and maintenance recommendations, as a minimum, the inspection and maintenance requirement shall include the following:
i. a monthly visual inspection of the system ductwork and material collection unit for leaks.

ii. an annual (for each 12 month period following the initial inspection) internal inspection of the bagfilters' structural integrity.

For WESP:

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

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

Because the application relies on vendor guaranteed emission factors and does not include estimated control efficiency, WESP performance testing will be required to establish control efficiency within 180 days of commencement of operation.

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 dryer and low sulfur diesel is combusted in the two emergency engines. Diesel is the worst case fuel. Firing diesel fuel (0.5% sulfur b.w.) will not cause this limit to be exceeded. 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. The Permittee will be required to establish 'normal' visible emissions from these sources within the first 30-days of the permit effective date. In order to demonstrate compliance, the Permittee will be required to observe actual visible emissions on a monthly basis for comparison to 'normal'. If emissions are observed outside of 'normal', the Permittee shall take corrective action. Recordkeeping and reporting are required. Because all emission sources are designed to be well controlled, compliance with this standard is expected.

III. Regulatory Review – Multiple Emission Source Limitations

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. Both the 250 hp emergency generator and the 250 hp fire pump engine are subject to the requirements of this regulation.

Under NSPS Subpart IIII, owners or operators of emergency generators manufactured in 2007 or later with a maximum engine power greater than or equal to 50 hp are required to comply with the emission limits referenced in 40 CFR §60.4205(b). These limits are as follows: 0.20 g/kW for PM; 3.5 g/kW for CO; and 4 g/kW for NOx + nonmethane hydrocarbons (NMHC).

Under NSPS Subpart IIII, owners or operators of fire pump engines manufactured after July 1, 2006 must comply with the emission limits in Table 4 of the subpart. The limits are as follows: 0.20 g/kW for PM; 3.5 g/kW for CO; and 4 g/kW for NOx + NMHC.

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

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

B. 15A NCAC 02D .1111 "Maximum 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. No further requirements apply to such engines under this part.

C. 15A NCAC 02D .1112 "112(g) Case-by-Case Maximum Achievable Control Technology" – Potential hazardous air pollutant (HAP) emissions from the proposed facility exceed the major source threshold (i.e. 10 tons per year any single HAP or 25 tons per year combined HAP). Section 112(g) of the Clean Air Act requires than any new stationary source that is not a regulated "source category" for which a NESHAP has not been established must control emissions to the levels that reflect "maximum achievable control technology (MACT). Wood pellet manufacturing plants are not a regulated source category. Therefore, the proposed plant will trigger 112(g).

Pursuant to Section 112(d)(3), MACT for new sources is the maximum degree of reduction in emissions that is deemed achievable and shall not be less stringent than the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator. The application identifies three (3) pellet facilities utilizing controls to reduce VOC/HAP emissions. Enviva believes the proposed dryer planned for construction at the Sampson facility represents an inherently lower emitting dryer that is substantially different from any dryer currently in operation equipped with RTO control.

The proposed rotary dryer is single pass and designed to minimize VOC/HAP emissions. One factor to minimize VOC/HAP emissions is to minimize the temperature of the wood within the dryer. Key design differences are discussed below:

1) Carefully managed dryer temperature, retention time, gas mixing space, and moisture content of wood to minimize smoldering and combustion. The dryer will use an improved flighting system to segregate particles for appropriate paced drying and reduce air leakage.
2) Utilize a high humidity environment to minimize temperature more effectively.
3) Engineered mixing of dryer flue gas with furnace hot gases using an improved recycle bustle and two (2) turbulators to ensure thorough mixing.

The vendor guarantees a VOC emission factor of 0.95 lb/ODT as propane.

Based on these design differences, Enviva is requesting the pellet mill dryer at its Faison, NC facility to be placed in a subcategory separate from other pellet mill dryers controlled by RTO. Section 112 of the Clean Air Act provides that EPA "may distinguish among classes, types, and sized of sources within a category or subcategory." Additionally, "The EPA maintains that, normally, any basis for subcategorization must be related to an effect on HAP emissions that is due to the difference in class, type, or size of the units." *Id.* at 489,493

NCDAQ believes the Enviva pellet mill dryer is designed to minimize HAP emissions to an extent not requiring add-on control. The dryer design is sufficiently different from other dryers in the industry to qualify to be subcategorized as a "low HAP emitting dryer not using add-on control." NCDAQ will require initial testing to develop a HAP emission factor.

Metal HAP emissions will be adequately controlled by cyclones in series with a wet ESP.

Other minor HAP sources include green wood hammermills, dry hammermills and hammermill area, twelve pellet presses and six pellet coolers. According to the application, there are currently no pellet mills utilizing HAP control technologies on these types of sources.

D. Compliance Assurance Monitoring (CAM)
The initial permit is a non-Title V permit and CAM will be addressed at the time the Title V permit is developed.

E. 15A NCAC 02D .0530 "Prevention of Significant Deterioration"
Congress first established the New Source Review (NSR) program as part of the 1977 Clean Air Act Amendments and modified the program in the 1990 Amendments. The NSR program requires pre-construction review prior to beginning actual construction. The basic goal of NSR is to ensure that the air quality in clean (i.e. attainment) areas does not significantly deteriorate while maintaining a margin for future industrial growth. The NSR regulations focus on industrial facilities, both new and modified, that create large increases in the emission of certain pollutants. PSD permits are a type of NSR permitting requirement for new major sources or sources making a major modification in an attainment area.

Pursuant to the Federal Register notice on February 23, 1982, North Carolina (NC) has full authority from the EPA to implement the PSD regulations in the State effective May 25, 1982. NC's State Implementation Plan (SIP)-approved PSD regulations have been codified in 15A NCAC 2D .0530, which implement the requirements of 40 CFR 51.166. The Code of Federal Regulations (CFR) in 15A NCAC 2D .0530 are incorporated by reference unless a specific reference states otherwise.

Under PSD requirements, all major new or modified stationary sources of air pollutants as defined in Section 169 of the Federal Clean Air Act (CAA) must be reviewed and permitted prior to construction by EPA or permitting authority, as applicable, in accordance with Section 165 of CAA. A "major stationary source" is defined as any one of 28 named source categories, which emits or has a potential to emit 100 tons per year of any regulated pollutant, or any other stationary source, which emits or has the potential to emit 250 tons per year of any PSD regulated pollutant. The lumber mill industry (SIC Code 2421) is not one of the 28 named source categories. However, the Enviva facility has the potential to emit greater than 250 tpy of a regulated NSR pollutant, and is therefore is a PSD major stationary source as defined in 40 CFR 51.166(b)(1)(i)(b).

The following table provides a summary of facility-wide potential emissions for PSD Applicability:

Emission Unit Description	**TSP** (tpy)	**PM-10** (tpy)	**PM-2.5** (tpy)	**VOC** (tpy)	**NOx** (tpy)	**CO** (tpy)	**SO_2** (tpy)	**Lead** (tpy)	**H_2SO_4** (tpy)	**Total HAP** (tpy)	**GHG as CO_2e** (tpy)
Dryer system	51.55	51.55	51.55	288.25	219.35	230.45	27.42	-	-	71.19	229,828
Hammermills	18.02	18.02	0.06	34.37	-	-	-	-	-	2.58	-
Pellet mill feed silo	0.37	0.37	0.37	-	-	-	-	-	-	-	-
Pellet mill fines Bin/Hammermill area	1.47	1.47	1.47	-	-	-	-	-	-	-	-
Pellet presses & coolers	59.47	15.49	1.90	227.64	-	-	-	-	-	5.93	-
Log bark hog	-	-	-	0.37	-	-	-	-	-	0.08	-
Log chipping	-	-	-	1.25	-	-	-	-	-	0.27	-
Green wood hammermills	3.00	3.00	3.00	50.53	-	-	-	-	-	2.83	-
Finished product handling/pellet Load-out	5.33	4.85	0.02	-	-	-	-	-	-	-	-

Emission Unit Description	TSP (tpy)	PM-10 (tpy)	PM-2.5 (tpy)	VOC (tpy)	NOx (tpy)	CO (tpy)	SO_2 (tpy)	Lead (tpy)	H_2SO_4 (tpy)	Total HAP (tpy)	GHG as CO_2e (tpy)
Paved roads	2.42	0.48	0.12	-	-	-	-	-	-	-	-
Dried wood handling	0.30	0.30	0.30	-	-	-	-	-	-	-	-
Green wood sizing & handling	0.016	0.008	0.001	-	-	-	-	-	-	-	-
Green wood storage piles	4.01	2.00	0.30	-	-	-	-	-	-	-	-
Diesel storage tanks	-	-	-	4.00E-03	-	-	-	-	-	-	-
Emergency generator	0.02	0.02	0.02	0.41	0.41	0.36	0.0002	-	-	1.69E-03	67
Fire water pump	0.02	0.02	0.02	0.41	0.41	0.36	0.0002	-	-	1.69E-03	67
Total	145.99	97.59	59.13	606	220.17	231.17	27.42	-	-	82.89	229,961

In accordance with the PSD requirements pursuant to 15A NCAC 2D .0530, Enviva performed the following reviews and analyses for PM-10/2.5, VOC, NOx, CO, and GHG emissions associated with the project:

- BACT determination (See Section IV);
- Air Quality Impact Analysis (See Section V); and
- Additional Impacts Analysis including effects on soils, vegetation, visibility, and Class I areas (See Section VII).

F. <u>15A NCAC 02Q .0500 "Title V Permitting"</u>
This is a greenfield facility and is being processed under the state construction and operating permit program initially. Within one year after commencement of facility operation, the Permittee will be required to submit a complete Title V application.

IV. BACT

A. <u>Introduction</u>
For each pollutant subject to a PSD review a Best Available Control Technology (BACT) review is required. The Clean Air Act defines BACT as:

> The term "best available control technology" means an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act emitted from or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of "best available control technology" result in emissions of any pollutant which will exceed the emissions allowed by any applicable standard established pursuant to section 111 or 112 of this Act. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under this paragraph as it existed prior to enactment of the federal Clean Air Act Amendments of 1990.

The BACT requirement is intended to ensure that the control systems incorporated in the design of the proposed source reflect the latest control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the facility. Given the variation between emission sources, facility configuration, local airsheds, and other case-by-case considerations, Congress determined that it was impossible to establish a single BACT determination for a particular pollutant or source. Economics, energy, and environmental impact are mandated in the CAA to be considered in the determination of case-by-case BACT for specific emission sources. In most instances, BACT may be defined through an emission limitation. In cases where this is impracticable, BACT can be defined by the use of a particular type of control device, work practice, or fuel type. In no event can a technology be recommended which would not comply with any applicable standard of performance under CAA §§111 (NSPS) or 112(HAPs).

The U.S. EPA developed guidance referred to as "Top Down BACT" for PSD applicants to use. However, NC DAQ does not strictly adhere to EPA's top-down guidance. Rather, NCDAQ implements BACT in accordance with the statutory and regulatory language. As such, NCDAQ's BACT conclusions may differ from those of the EPA.

B. Proposed BACT Limits

BACT is determined on a case-by-case basis taking into account energy, environmental, and economic impacts and other costs. The table below provides a summary of the NCDAQ proposed BACT limits that will be sent to public notice.

Unit	Pollutant	BACT Limit*	Units	Averaging Period	Technology
Wood-fired dryer	NOx PM/PM10/2.5 VOC** CO GHG	0.20 0.105 (filterable) 1.07 0.21 230,000	lb/MMBtu lb/ODT lb/ODT lb/MMBtu tpy CO2e	3-hour 3-hour 3-hour 3-hour Annual	Good Combustion Practices/low NOx burners Cyclones/WESP Process Design Process Design Use of Biomass fuel
Green wood hammermills	PM/PM10/2.5 VOC**	0.004 (filterable) 0.27	gr/cf lb/ODT	3-hour 3-hour	Bin vent filter Good operating & maintenance procedures
Dry hammermills	PM/PM10/2.5 VOC	0.004/0.004/ 0.000014 (filterable) 0.24	gr/dscf lb/ODT	3-hour 3-hour	Cyclones & bagfilters Process Design
Pellet mill feed silo	PM/PM10/2.5	0.004 (filterable)	gr/dscf	3-hour	Bin vent filter
Hammermill area and Pellet mill fines bin	PM/PM10/2.5	0.004 (filterable)	gr/dscf	3-hour	Bin vent filter
Final product handling	PM/PM10/2.5	0.004/0.004/ 0.000014 (filterable)	gr/cf	3-hour	Bagfilter
Pellet coolers	PM/PM10/2.5 VOC**	0.022/0.0057/ 0.0007 (filterable) 0.85	gr/cf lb/ODT	3-hour 3-hour	Cyclones Process design
Log bark hog, chipper, and storage tanks	VOC	N/A	N/A	-	Fugitive – uncontrolled
Green wood handling	PM/PM10/2.5	N/A	N/A	-	Inherent moisture

Unit	Pollutant	BACT Limit*	Units	Averaging Period	Technology
Storage piles	PMPM10/2.5 VOC	N/A	N/A	-	Inherent moisture Fugitive – uncontrolled
Road dust	PM/PM10/2.5	N/A	N/A	-	Paving & water spray
Emergency engine, fire water pump, and backup chipper	NMHC+NOx CO PM (filterable only)	3.0 2.6 0.15	g/bhp-hr g/bhp-hr g/bhp-hr	3-hour 3-hour 3-hour	Design and Good operating practices NSPS Certification
Storage tanks	VOC	N/A	N/A	-	Good operating practices

*BACT emission limits shall apply at all times except the following: Emissions resulting from start-up, shutdown or malfunction above those given in the table above are permitted provided that optimal operational practices are adhered to and periods of excess emissions are minimized.
**The VOC limit is expressed as alpha pinene basis per the procedures in EPA OTM 26.

C. Dryer System (ID No. ES-DRYER)
The rotary dryer uses direct contact heat provided by a 250.4 million Btu/hour wood burner system. The dryer will process 71.71 ODT/hour. The following table taken from the application provides a summary of criteria pollutant emissions:

Pollutant	Baseline Uncontrolled Emission Factors	Proposed BACT Emission Factor	Baseline Emissions (tpy)	Total Controlled Potential Emissions (tpy)
CO[1]	0.210 lb/MMBtu	0.210 lb/MMBtu	230.5	230.5
NOx[2]	0.200 lb/MMBtu	0.200 lb/MMBtu	219.4	219.4
SO_2[3]	0.025 lb/MMBtu	0.025 lb MMBtu	27.4	27.4
VOC[4]	1.07 lb/ODT	1.07 lb/ODT	288	288
Total PM-10[5]	2.092 lb/ODT	0.105 lb/ODT (filterable) *[which is equivalent to 0.030 lb/MMBTU]*	580.9	51.5

Notes:
1 CO emissions are based on stack testing conducted at Ahoskie, NC facility on June 7, 2012 with a conservative safety margin.
2 NOx and filterable PM-10 emissions based on vendor guarantee (TSI, 7/15/14).
3 SO_2 emissions calculated based on AP-42, Section 1.6 factor.
4 VOC emission factor based vendor guarantee of 0.95 lb/ODT as propane converted to alpha-pinene and Enviva Wiggins October 2013 Stack Test Data as Total VOC.
5 Dryer vendor provided estimates for filterable PM-10. AP-42, Section 1.6 was used to calculate the condensable fraction.

The pollutants emitted from the dryer that are subject to BACT review are NOx, TSP/PM-10/PM-2.5, VOC, and CO.

1. BACT for NOx – The applicant includes three potentially applicable NOx control technologies as follows:
   - Conventional Selective Catalytic Reduction (SCR), Regenerative Selective Catalytic Reduction (RSCR): SCR involves the injection of ammonia (NH_3) into the flue gas stream ahead of a catalyst bed. On the catalyst surface, ammonia reacts with NO_x contained within the air to form nitrogen gas (N_2) and water (H_2O), and
   - Selective Non-Catalytic Reduction (SNCR); SNCR describes a process by which NO_X is reduced to molecular nitrogen (N_2) and water (H_2O) by injecting an ammonia or urea ($CO(NH_2)_2$) spray into the post-combustion area of the unit. Typically, injection nozzles are located in the upper area of the furnace and convective passes. Once injected, the urea

or ammonia decomposes into NH_3 or NH_2 free radicals, reacts with NO_X molecules, and reduces to nitrogen and water.

The three technologies mentioned above are considered technically feasible.

RSCR (0.068 lb/million Btu NOx):

Economic Impacts:
Capital and operating costs are based on vendor quotes, OAQPS Manual, and past permitting experience. Other cost impacts are estimated using EPA cost methodologies. As shown in Table D-4 of the application, the cost effectiveness of operation of RSCR is approximately $13,132 per ton. When considering other similar operations, the cost is prohibitive. RSCR is eliminated from further consideration.

Energy Impacts:
Energy requirements for a RSCR system consist primarily of the power needed for the fan and fan power to overcome catalyst pressure. It is estimated that the energy impact associated with it is approximately 4.19×10^6 KWH/year.

Environmental Impacts:
There are no major adverse environmental impacts.

SCR (0.068 lb/million Btu NOx)

Economic Impacts:
As shown in Tables D-2 and D-5 of the application, SCR can achieve an annual average NOx level of 0.068 lb/million Btu at approximately $22,164 per ton of NOx reduction. When considering other similar operations, this is cost prohibitive. SCR is eliminated from further consideration.

Energy Impacts:
Energy requirements for an SCR system primarily consist of the power needed for ammonia injection. It is estimated that the energy impact associated with SCR control is approximately 2.51×10^7 KWH/year.

Environmental Impacts:
There are no major adverse environmental impacts.

SNCR (0.150 lb/million Btu NOx)
An SNCR control of 0.150 lb/million Btu was determined based on discussions with a vendor.

Economic Impacts:
As shown in Tables D-3 and D-4 of the application, the SNCR can achieve a NOx level of 0.150 lb/million Btu at approximately $3,176 per ton of NOx reduction. This is not considered cost effective given the negligible impact of the dryer on air quality. The maximum modeled one-hour average concentration for nitrogen dioxide is 65.1 ug/m^3, which is approximately 35% of the NAAQS. The maximum dryer contribution is 16.6 ug/m^3 at the maximum receptor. SNCR is eliminated from further consideration.

Energy Impacts:
Energy requirements for an SNCR system primarily consist of the power needed for ammonia injection. It is estimated that the energy impact associated with the SNCR control is approximately 1.92×10^4 KWH/year.

Environmental Impacts:
There are no major adverse environmental impacts.

The baseline emission rate proposed by the dryer vendor is 0.20 lb/million Btu. The applicant proposes a BACT limit of 0.20 lb/million Btu based on good combustion practices and use of low NOx burners. NCDAQ agrees with the applicant's proposed BACT.

2. BACT for Particulate matter (TSP/PM-10/PM-2.5) – The applicant includes three potentially applicable PM control technologies as follows:
   - Bagfilter; use fabric bags as filters to collect particulate matter. Particle characteristics that affect the collection efficiency include particle size distribution, particle cohesion characteristics, and particle electrical resistivity.
   - Electrostatic Precipitator (ESP); ESPs remove particles from a gas stream through the use of electrical forces. Discharge electrodes apply a negative charge to particles passing through a strong electrical field. These charged particles then migrate to a collecting electrode having an opposite, or positive, charge. Collected particles are removed from the collecting electrodes by periodic mechanical rapping, and
   - Wet Electrostatic Precipitator (WESP); WESPs versus dry ESPs are utilized in the forest products industries for control of emissions from similar dryer sources because dry ESPs cannot reliably operate due to resin buildup on collection electrodes.

   Exhaust leaving the process is sufficiently laden with moisture and resinous compounds that condensation in the bagfilter unit frequently occurs. Use of a bagfilter is technically infeasible due to the condensation of resinous compounds leading to blinding of the filters. Dry ESP are not designed to operate under conditions in which the gas stream contains water vapor or resinous compounds. Due to the moist gas stream, it would be expected to see particulate agglomeration on the dry ESP. The dry ESP is technically infeasible. Therefore, the bagfilter and dry ESP are eliminated from consideration in the BACT analysis.

   For the remaining technically feasible control technology, according to the applicant, the cost effectiveness of achieving the most stringent control option of 0.105 lb filterable PM/ODT using WESP control is $3,254 per ton. The applicant proposes a BACT limit of 0.105 lb filterable PM/ODT based on utilization of cyclones followed by WESP. NCDAQ agrees with the applicant's proposed BACT.

3. BACT for VOC and CO – The applicant includes the following potentially applicable VOC control technologies:
   - Process design;
   - Regenerative Thermal Oxidation (RTO); preheated, partially oxidized gases then enter a combustion chamber where they are heated by auxiliary fuel (natural gas) combustion to a final oxidation temperature typically between 760 to 820 °C (1400 to 1500 °F) and maintained at this temperature to achieve maximum VOC destruction,
   - Regenerative Catalytic Oxidation (RCO); operates in the same fashion as an RTO, but it requires only moderate reheating to the operating range of the catalyst, approximately 450 °F. Particulate control must be placed upstream of an RCO.
   - Thermal Catalytic Oxidation (TCO); operates much in the same fashion as an RCO,
   - Packed-bed Catalytic Wet Scrubber; this technology is reportedly able to reduce overall VOC emissions by approximately 30 percent, and
   - Bio-oxidation/Bio-filtration; VOCs are oxidized using living micro-organisms on a media bed where microbes consume and metabolize the excess organic pollutants, converting them into CO_2 and water, much like a traditional oxidation process.

   Only RCO and TCO are suitable to control CO.

   Packed-bed catalytic wet scrubber: According to the applicant, this technology is still in early start-up mode of operation at its first full-scale demonstration. As stated in the application, until the technology can be demonstrated to operate reliably with an established VOC control efficiency over an extended period, it is not considered to be feasible. Therefore, it is eliminated from further consideration in the BACT analysis.

Bio-oxidation/Bio-filtration: The effectiveness of this technology remains in question. The use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Therefore, it is eliminated from further consideration in the BACT analysis.

Regenerative Catalytic Oxidation/Thermal Catalytic Oxidation: According to the applicant, there are no wood pellet manufacturing facilities using RCO/TCO and operation of an RCO/TCO downstream of drying operations utilizing WESP are prone to corrosion and catalyst fouling due to deposition of entrained salts and high operating temperatures. Therefore, RCO/TCO is eliminated from further consideration in the BACT analysis.

Regenerative Thermal Oxidation (0.107 lb VOC/ODT and 0.042 lb CO/MMBtu): This control technology had been demonstrated to be technically feasible.

Economic Impact: Capital and operating costs are based on vendor quotes, OAQPS Manual, and past permitting experience. Other cost impacts are estimated using EPA cost methodologies. The economic life of the RTO is 10 years as supplied by the vendor. As shown in Table D-8 of the application, the cost effectiveness of operation of the RTO is approximately $7,245 per ton VOC. When considering other similar operations, the cost is prohibitive. Operation of the unit will have negligible impact on ozone formation as this region is considered "NOx limited."

As shown in Table D-9, the CO cost effectiveness of operation of the RTO is approximately $10,194 per ton CO. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the RTO is approximately 5.2×10^6 KWH/year.

Environmental Impact: There are adverse environmental impacts from operation of an RTO. NOx emissions will increase which can lead to increased formation of ozone in NOx limited regions, and GHGs will increase as by-products of natural gas used for supplemental fuel and actual VOC destruction.

Process Design (1.07 lb VOC/ODT and 0.21 lb CO/MMBtu): There are no adverse economic, energy, or environmental impacts associated with designing the plant to utilize at least 25% hardwood and incorporating a low temperature drying system. Use of hardwood is used to establish baseline emissions.

The applicant proposes a BACT limit of 1.07 lb VOC/ODT and 0.21 lb CO/MMBtu utilizing at least 25% hardwood and good operating and maintenance procedures. NCDAQ agrees with the applicant's proposed BACT.

Testing

4. Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the BACT emission limits by conducting performance test on the dryer system utilizing EPA reference methods, as in effect on the date of permit issuance, contained in 40 CFR 60, Appendix A, 40 CFR 63, and/or OTM 26 AND in accordance with a testing protocol (using testing protocol submittal form) approved by the Division of Air Quality, as follows:

Unit	Pollutant	BACT Limit	Units	Averaging Period	Testing
Dryer system	NOx	0.20	lb/MMBtu	3-hour	Annually
	Filterable PM	0.105	lb/ODT	3-hour	Annually
	VOC	1.07	lb/ODT	3-hour	Initial Only
	CO	0.21	lb/MMBtu	3-hour	Initial Only

Initial testing shall be completed and the results submitted within 180 days of commencement of operation unless an alternate date is approved by the DAQ.

Monitoring/Recordkeeping

5. The Permittee shall not process more than 537,625 ODT of pellets per year. The Permittee shall not process more than 75% softwood on a 12-month rolling basis. The process rate and hardwood/softwood mix shall be recorded in a monthly log. The log (written or electronic format) shall be maintained on-site and made available to an authorized representative upon request.

D. Green Wood Hammermills (ID Nos. ES-GHM-1 and GHM-2) : VOC emissions are released during the green wood hammermill process due the heat generated by mechanical milling the green wood. The VOC emission factor of 0.24 lb/ODT was developed from Enviva Amory October 2013 Stack Testing with a throughput of 60% softwood. Potential VOC emissions are estimated to be 34.37 tpy.

1. BACT for VOC – The applicant proposes the following potentially applicable VOC control technologies:
   - Process design;
   - Regenerative Thermal Oxidation (RTO);
   - Regenerative Catalytic Oxidation (RCO);
   - Thermal Catalytic Oxidation (TCO);
   - Packed-bed Catalytic Wet Scrubber; and
   - Bio-oxidation/Bio-filtration

Packed-bed wet scrubber: According to the applicant, this technology is still in early start-up mode of operation at its first full-scale demonstration. Until the technology can be demonstrated to operate reliably with an established VOC control efficiency over an extended period, it is not considered to be feasible. Therefore, it is eliminated from further consideration in the BACT analysis.

Bio-oxidation/Bio-filtration: The effectiveness of this technology remains in question. The use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Therefore, it is eliminated from further consideration in the BACT analysis.

Regenerative Thermal Oxidation designed for 90% control (0.027 lb VOC/ODT): This control technology had been demonstrated to be technically feasible.

Economic Impact: Capital and operating costs are based on vendor quotes, and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. The economic life of the RTO is 10 years as supplied by the vendor. As shown in Table D-15 of the application, the cost effectiveness of operation of the RTO is approximately $9,813 per ton. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the RTO is approximately 1.13×10^6 KWH/year.

Environmental Impact: There are adverse environmental impacts from operation of an RTO. NOx emissions will increase which can lead to increased formation of ozone in NOx limited regions, and GHGs will increase as by-products of natural gas used for supplemental fuel and actual VOC destruction.

Regenerative Catalytic Oxidation designed for 90% control (0.027 lb VOC/ODT): This control technology had been demonstrated to be technically feasible.

Economic Impact: Capital and operating costs are based on vendor quotes, and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. As shown in Table D-15 of the application, the cost effectiveness of operation of the RCO is approximately $10,731 per ton. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the RTO is approximately 3.24 x 10^5 KWH/year.

Environmental Impact: There are adverse environmental impacts from operation of an RTO. NOx emissions will increase which can lead to increased formation of ozone in NOx limited regions, and GHGs will increase as by-products of natural gas used for supplemental fuel and actual VOC destruction.

The applicant proposes a BACT limit of 0.27 lb VOC/ODT based on good operating and maintenance procedures. NCDAQ agrees with the applicant's proposed BACT.

Testing

2. Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the BACT emission limits by conducting performance test on one of the green wood hammermills utilizing EPA reference methods, as in effect on the date of permit issuance, contained in 40 CFR 60, Appendix A, 40 CFR 63, and/or OTM 26 AND in accordance with a testing protocol (using testing protocol submittal form) approved by the Division of Air Quality. Testing shall be conducted within 180 days of commencing operation.

E. Dry Hammermills (ID Nos. ES-HM-1 through HM-8), Hammermill Area Bagfilter (ID No.ES-HMA), Green Wood Hammermills (ID Nos. ES-GHM-1 and GHM-2), Pellet Mill Feed Silo (ID No. ES-PMFS), Pellet Fines Bin (ID No. ES-PFB), Dry Wood Handling (ID No. ES-PB and ES-PL), Finished Product Handling (ID No.ES-FPH)

1. Particulate Matter (TSP/PM-10/PM-2.5) -The applicant proposes utilizing bagfilters or bin vent filters for the above mentioned sources. According to the applicant, the filters are capable of achieving the lowest emission rates for filterable PM.

2. The applicant proposes a TSP/PM-10/PM-2.5 BACT limit for the green wood hammermills, hammermill area, pellet mill feed silo, pellet fines bin, and dry wood handling based on an outlet grain loading factor of 0.004 gr/cf.

3 The applicant proposes a TSP/PM-10/PM-2.5 BACT limit for the dry hammermills and finished product handling of 0.004/0.004/0.000014 gr/cf.

F. Dry Hammermills (ID Nos. ES-HM-1 through HM-8)
In addition to PM emissions, some VOC are emitted from the dry hammermills.

1. BACT for VOC – The applicant proposes the following potentially applicable control technologies:
   - Regenerative Thermal Oxidation (RTO);
   - Regenerative Catalytic Oxidation (RCO);
   - Thermal Catalytic Oxidation (TCO);
   - Packed-Bed Catalytic Wet Scrubber; and
   - Bio-oxidation/Bio-filtration.

Packed-bed wet scrubber: According to the applicant, this technology is still in early start-up mode of operation at its first full-scale demonstration. As stated in the application, until the technology can be demonstrated to operate reliably with an established VOC control efficiency over an extended period, it is not considered to be feasible. Therefore, it is eliminated from further consideration in the BACT analysis.

Bio-oxidation/Bio-filtration: The effectiveness of this technology remains in question. The use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Therefore, it is eliminated from further consideration in the BACT analysis.

Regenerative Thermal Oxidation designed for 90% control (0.024 lb VOC/ODT): This control technology had been demonstrated to be technically feasible.

Economic Impact: Capital and operating costs are based on vendor quotes, and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. The economic life of the RTO is 10 years as supplied by the vendor. As shown in Table D-16 of the application, the cost effectiveness of operation of the RTO is approximately $52,643 per ton. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the RTO is approximately 4.4 x 10^6 KWH/year.

Environmental Impact: There are adverse environmental impacts from operation of an RTO. NOx emissions will increase which can lead to increased formation of ozone in NOx limited regions, and GHGs will increase as by-products of natural gas used for supplemental fuel and actual VOC destruction.

Regenerative Catalytic Oxidation designed for 90% control (0.024 lb VOC/ODT): This control technology had been demonstrated to be technically feasible.

Economic Impact: Capital and operating costs are based on vendor quotes, and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. As shown in Table D-16 of the application, the cost effectiveness of operation of the RCO is approximately $41,981 per ton VOC. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the RTO is approximately 1.41 x 10^6 KWH/year.

Environmental Impact: There are adverse environmental impacts from operation of an RTO. NOx emissions will increase which can lead to increased formation of ozone in NOx limited regions, and GHGs will increase as by-products of natural gas used for supplemental fuel and actual VOC destruction.

The applicant proposes a BACT limit of 0.24 lb VOC/ODT based on good operating and maintenance procedures. NCDAQ agrees with the applicant's proposed BACT.

G. Pellet Coolers (ID Nos. ES-CLR-1 through CLR-6)
The pellet presses discharge formed pellets through one of six pellet coolers. Cooling air is passed through the pellets. The pellets contain a small amount of wood fines which become entrained in the cooling air. The VOC emission factor of 0.85 lb/ODT was developed from Enviva Wiggins October 2013 Stack Test with a throughput of 62.5% softwood. Potential emissions from the presses and coolers is estimated to be 227.64 tpy.

1. BACT for Particulate matter (TSP/PM-10/PM-2.5 – The applicant proposes three potentially applicable PM control technologies as follows:
   - Cyclones;
   - Bagfilter; and
   - Electrostatic Precipitator (ESP).

Electrostatic Precipitator: Bagfilters and ESP are both technically feasible. However, because bagfilters can be designed to be as efficient as ESP, only bagfilter control is considered in the analysis.

Bagfilter designed for 97% control efficiency:

Economic Impact: Capital and operating costs are based on vendor quotes, OAQPS Manual, and past permitting experience. As shown in Table D-20a, b, and c of the application, the cost effectiveness of operation of a bagfilter compared with the use of cyclones has an incremental cost effectiveness of \$24,098.00/ton PM, \$92,776.00/ton PM-10, and \$757,353.00/ton PM-2.5. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the bagfilter is approximately 1.2×10^6 KWH/year

Environmental Impact:
There are no adverse environmental impacts from operation of bagfilters.

Cyclone designed for 90% control efficiency:

Economic Impact: Capital and operating costs are based on vendor quotes, OAQPS Manual, and past permitting experience. As shown in Table D-20a, b, and c of the application, the cost effectiveness of the cyclones is \$188.00/ton PM, \$724.00/ton PM-10, and \$5,897/ton PM-2.5. This is not considered cost prohibitive.

Energy Impact: The additional energy required to operate the cyclones is approximately 1.2×10^6 KWH/year.

Environmental Impact:
There are no adverse environmental impacts from the operation of cyclones.

The applicant proposes a BACT limit of 0.022 gr PM/cf, 0.0057 gr PM-10/cf, and 0.0007 gr PM-2.5/cf based on utilization of cyclones. NCDAQ agrees with the applicant's proposed BACT.

2. BACT for VOC – The applicant proposes the following potentially applicable control technologies:
   - Regenerative Thermal Oxidation (RTO);
   - Regenerative Catalytic Oxidation (RCO);
   - Thermal Catalytic Oxidation (TCO);
   - Packed-Bed Catalytic Wet Scrubber; and
   - Bio-oxidation/Bio-filtration.

Packed-bed wet scrubber: According to the applicant, this technology is still in early start-up mode of operation at its first full-scale demonstration. As stated in the application, until the technology can be demonstrated to operate reliably with an established VOC control efficiency over an extended period, it is not considered to be feasible. Therefore, it is eliminated from further consideration in the BACT analysis.

Bio-oxidation/Bio-filtration: The effectiveness of this technology remains in question. The use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Therefore, it is eliminated from further consideration in the BACT analysis.

Regenerative Thermal Oxidation designed for 90% control (0.08 lb VOC/ODT): This control technology had been demonstrated to be technically feasible.

Economic Impact: Capital and operating costs are based on vendor quotes, and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. The economic life of the RTO is 10 years as supplied by the vendor. As shown in Table D-23 of the application, the cost effectiveness of operation of the RTO is approximately \$11,945 per ton. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the RTO is approximately 4.3×10^6 KWH/year.

Environmental Impact: There are adverse environmental impacts from operation of an RTO. NOx emissions will increase which can lead to increased formation of ozone in NOx limited regions, and GHGs will increase as by-products of natural gas used for supplemental fuel and actual VOC destruction.

Regenerative Catalytic Oxidation designed for 90% control (0.08 lb VOC/ODT): This control technology had been demonstrated to be technically feasible.

Economic Impact: Capital and operating costs are based on vendor quotes, and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. As shown in Table D-23 of the application, the cost effectiveness of operation of the RCO is approximately $11,233 per ton. This is considered cost prohibitive.

Energy Impact: The additional energy required to operate the RTO is approximately 1.48 x 10^5 KWH/year.

Environmental Impact: There are adverse environmental impacts from operation of an RTO. NOx emissions will increase which can lead to increased formation of ozone in NOx limited regions, and GHGs will increase as by-products of natural gas used for supplemental fuel and actual VOC destruction.

The applicant proposes a BACT limit of 0.85 lb VOC/ODT on an annual average basis based on good operating and maintenance procedures. NCDAQ agrees with the applicant's proposed BACT.

Testing

3. Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall demonstrate compliance with the BACT emission limits by conducting performance test on one of the pellet coolers utilizing EPA reference methods, as in effect on the date of permit issuance, contained in 40 CFR 60, Appendix A, 40 CFR 63, and/or OTM 26 AND in accordance with a testing protocol (using testing protocol submittal form) approved by the Division of Air Quality. Testing shall be conducted within 180 days of commencing operation.

H. Log Bark Hog/Log Chipping/Diesel Storage Tanks (ID Nos. ES-BARKHOG, ES-CHIP-1)
VOC emissions from these sources are considered fugitive and add on controls are not practicable. According to the applicant, there are no known good operating practices that would reduce emissions. Therefore, no VOC control is proposed.

I. Green Wood Handling and Storage Pile (ID Nos. (IES-GWHS and IES-GWSP)
PM emissions from the storage pile and handling are considered fugitive. According to the applicant, PM emissions are negligible due to the high moisture content. Use of water spray or chemical suppressants is unnecessary and would result in increases in emissions at the dryers due to combustion of additional fuel to remove the additional moisture.

VOC will also be emitted. According to the applicant, there are no practicable methods for VOC reduction.

J. Road Dust
The applicant proposes paved roads be used for raw material delivery, pellet load-out, and employee traffic. PM emissions will be fugitive. To minimize fugitive PM, the applicant proposes to water areas of paved roads as needed. This technique will reduce emissions by an estimated 90% and is proposed as BACT for paved roads. NCDAQ agrees with the applicant's proposed BACT.

K. Emergency Fire Pump & Emergency Generator (ID Nos. ES-FWP and ES-GN)
A diesel-fired fire pump and emergency generator are proposed for this facility. According to the applicant, the engines will be certified to meet the provisions of NSPS Subpart IIII. The engines will use fuel with a maximum sulfur content of 0.0015 weight percent (15 ppmw).

BACT for these engines will be the applicable NSPS and MACT standards. The table below summarizes the proposed BACT limits:

	CO	PM-10/2.5	NMHC + NOx	GHG
BACT	3.5 g/kW-hr	0.20 g/kW-hr	4.0 g/kW-hr	GCP

Other than for use during emergency service, the engines are limited to a maximum of 100 hours per year of operation for maintenance and readiness testing under the NSPS. The applicant will install non-resettable hour meters to monitor and record monthly engine operation.

Add-on controls are impractical given the intermittent operation. The applicant proposes good combustion practices, as recommended by the manufacturer. NCDAQ agrees with the applicant's proposed BACT.

L. Greenhouse Gasses (CO_2, CH_4, N_2O)

Using DAQ spreadsheets, the applicant estimates CO_2e emissions from this proposed plant to be 229,828 tons per year. Because there will be a significant emissions increase of GHG from the wood-fired dryer, a BACT analysis is being conducted. CO, CH_4, and N_2O are anticipated from wood combustion, thus a BACT review must be conducted for CO_2e.

1. BACT for GHG – The applicant proposes the following potentially applicable control technologies:
   - Carbon capture and storage (CCS);
   - Selection of lowest carbon fuel;
   - Installation of energy efficient options
   - Fuel switching – According to GHG BACT Guidance, fuel switching is only applicable to coal-fired and oil-fired boilers.

Carbon capture and storage: As stated in the application CCS is technically infeasible for the following reasons;

a. In post combustion CO_2 capture, flue gas is exhausted at atmospheric pressure and a lower concentration relative to pre-combustion capture. Post combustion CO_2 capture is problematic because to the low pressure and dilute concentration means a high volume of gas needs to be treated. Additional challenges stem from impurities in the flue gas that tend to negatively affect the ability to absorb CO_2, and the compression of CO_2 would require a substantial auxiliary power load, resulting in additional fuel consumption.

b. The availability of a mechanism to permanently sequester the captured gas is not present. There is no existing nearby pipeline for CO_2 transport. Also, since the availability and proximity of adequate storage in geologic formations is unknown, sequestration is not a technically feasible option.

CCS as a combined technology is not considered technically feasible as BACT for reducing CO_2 emissions. Therefore, CCS is eliminated as a potential control option.

Selection of lowest carbon fuel: According to the application, firing of lower carbon fuel is a technically feasible option. However, the applicant's intent is to continue to use biomass as EPA has recognized it as a GHG beneficial fuel due to its renewable nature. Therefore, this option is eliminated as a potential control option.

Installation of Energy Efficient Options: Operating practices can increase energy efficiency and are a potential control option for improving fuel efficiency, thus providing a benefit relative to GHG emissions. Efficiency options for the wood-fired dryer are similar to those provided in the October 2010 EPA whitepaper for boilers and include:

Burner design efficiency,
Dryer maintenance,
Dryer process control,
Reduction in flue gas quantities,

Reduction/minimization of excess air,
Heat/Flue gas recovery, and
Use of thermal oxidizers employing heat recovery

Each of the energy efficiency options is technically feasible except the use of regenerative thermal oxidizers (RTO). As discussed earlier in this report, RTO technology will increase NOx emissions, is not cost effective, and is technically infeasible for the dryer.

Installation of energy efficient options is the only remaining technically feasible option for minimizing CO_2e emissions. No adverse energy, environmental, or economic impacts are associated with energy efficient operating practices.

BACT will consist of a combination of best operating practices that implement energy efficient measures.

V. Air Quality Impact Analysis

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

A detailed description of the modeling and modeling methodology is described below.

Project Description / Significant Emission Rate (SER) Analysis
Enviva Pellets Sampson, LLC (Enviva) plans to construct and operate a wood pellet manufacturing plant in Sampson County near Faison, NC. Operations are expected to occur 24 hours per day, 7 days per week and 52 weeks per year. A facility-wide emissions analysis was accomplished and documented in Table 3-1 of the Enviva permit application. Five pollutants were declared to exceed their PSD Significant Emission Rate (SER) and thus require a PSD analysis. These emission rates are provided in the table below.

Table 1 - Pollutant Netting Analysis

Pollutant	Annual Emission Rate (tons/yr)	Significant Emission Rate (tons/yr)	PSD Review Required?
NO_2	**220.17**	40	Yes
PM_{10}	**97.59**	15	Yes
$PM_{2.5}$	**59.13**	10	Yes
TSP*	**145.99**	25*	Yes*
SO_2	**27.42**	40	No
CO	**231.17**	100	Yes
VOC's	**606**	40	Yes
GHG	**229,828 as CO_2e**	75,000 as CO_2e	Yes

*N.C. requirement only.

Preliminary Impact Air Quality Modeling Analysis
An air quality preliminary impact analysis was conducted for the pollutants exceeding the corresponding SER. The modeling results were then compared to applicable Significant Impact Levels (SILs) as defined in the NSR Workshop Manual to determine if a full impact air quality analysis would be required for that pollutant.

The Enviva facility will be located near Faison, NC, in Sampson County. The facility area is in the southeastern coastal plain with terrain being predominantly flat and is generally agricultural, industrial, and forest land. For modeling purposes, the area, including and surrounding the site, is classified rural, based on the land use type scheme established by Auer 1978.

Enviva evaluated the pollutants' significant emissions using the EPA AERMOD model and five years (2008-2012) of National Weather Service (NWS) surface (Fayetteville) and upper air (Greensboro) meteorological data. Full terrain elevations were included, as were normal regulatory defaults. Sufficient receptors were placed in ambient air beginning at the fenceline to establish maximum impacts. Emission rates for this specific project were used and the maximum impacts were then compared to the SIL. Since the results showed impacts above the SILs for PM_{10}, $PM_{2.5}$, and NO_2, further modeling was required for those pollutants. The SIL results are shown in Table 2.

Table 2 - Class II Significant Impact Results (ug/m^3)

Pollutant	Averaging Period	Facility maximum Impact	Class II Significant Impact Level	Significant Impact Distance (km)
CO	1-hour	49.65	2,000	N/A
	8-hour	38.35	500	
PM_{10}	annual	**4.62**	1	2.5
	24-hour	**34.84**	5	
$PM_{2.5}$	annual	**1.19**	.3	2.5
	24-hour	**7.45**	1.2	
NO_2	annual	**2.29**	1	3.0
	1-hour	**39.71**	10	

Class II Area Full Impact Air Quality Modeling Analysis

A Class II Area NAAQS and PSD increment analysis was performed for PM_{10}, $PM_{2.5}$, and NO_2 to include offsite source emissions and background concentrations (NAAQS). Enviva used AERMOD with the modeling methodology as described above. Off-site source inventories for both increment and NAAQS modeling were obtained from NCDAQ and then refined by Enviva using the NCDAQ approved "Q/D=20" guideline. For the NO_2 NAAQS analysis, 6 offsite sources (all from the same facility) were used; the same sources were also used for the increment analysis. These sources, along with their emission rates, are provided in the attachments. For the PM_{10} and $PM_{2.5}$ NAAQS and increment analyses, no offsite sources were included since Enviva is the only facility to trigger review for those pollutants since their respective established baseline dates.

Enviva used an appropriate array of receptors beginning at the declared fenceline and extending outward to 5 kilometers. PM_{10} background concentrations were obtained from the Cumberland County PM_{10} monitoring station. The Duplin County monitor was used for $PM_{2.5}$ background concentrations. NO_2 background concentrations were obtained from a monitor located in Paulding County, GA since it was judged to be most representative of the rural NO_2 background concentrations for the Sampson County region. The modeling results are shown in Table 3 and indicate compliance with the NAAQS for PM_{10}, $PM_{2.5}$, and NO_2.

Table 3 - Class II Area NAAQS Modeling Results

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	Background Concentration (ug/m3)	Total Impact (ug/m3)	NAAQS (ug/m3)	% NAAQS
PM_{10}	24-hour	29.62	25.00	54.62	150	36
$PM_{2.5}$	24-hour	5.32	19.00	24.32	35	67
	annual	1.19	7.76	8.95	12	75
NO_2	1-hour	46.27	32.10	78.37	188	42
	annual	3.14	5.30	8.44	100	8

In the CLASS II increment analysis, Enviva used the same onsite sources, property boundary, and receptors as in the NAAQS analysis. The emission rates modeled are provided in the attachments. The Class II Area increment modeling results are shown in Table 4 and indicate compliance with the Class II Area increments.

Table 4 - Class II Area PSD Increment Modeling Results

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	PSD Increment (ug/m3)	% Increment
PM_{10}	24-hour	29.62	30	99
	annual	4.62	17	27
$PM_{2.5}$	24-hour	7.60	9	84
	annual	1.31	4	33
NO_2	annual	3.14	25	13

Non Regulated Pollutant Impact Analysis (North Carolina Toxics)

Enviva also modeled TSP and eight toxics using AERMOD with the same receptor array and meteorology as used in the NAAQS analysis. A list of the facility sources and emission rates used are attached to this document. All pollutants demonstrated compliance on a source-by-source basis with the NC's AAQS or Acceptable Ambient Level (AAL). The maximum concentrations as shown in Table 5 occurred along the property boundary.

Table 5 – Non-Regulated Pollutants Modeling Results

Pollutant	Averaging Period	Max Facility Impact (µg/m3)	AAL (µg/m3)	Percent of AAL
TSP	annual	10.27	75	14
	24-hr	73.02	150	49
Arsenic	annual	1.00e-5	2.3e-4	4
Benzo(a)pyrene	annual	2.00e-5	3.3e-2	< 1
Cadmium	annual	1.91e-6	5.5e-3	< 1
Chlorine	1-hour	0.13	900	< 1
	24-hour	5.5e-02	37.5	< 1
Formaldehyde	1-hour	6.32	150	4
Hexachlor.dioxin	annual	1.00e-5	7.6e-5	13
Hydrogen chloride	1-hour	0.31	700	< 1

Pollutant	Averaging Period	Max Facility Impact (µg/m3)	AAL (µg/m3)	Percent of AAL
Vinyl chloride	annual	1.20e-4	0.38	< 1

Pursuant to 15A NCAC 02Q .0702 "Exemptions" (a)(27), A permit to emit toxic air pollutants shall not be required under this Section for an air emission source that is any of the following:

(A) subject to an applicable requirement under 40 CFR Part 61, as amended;
(B) an affected source under 40 CFR Part 63, as amended; or
(C) subject to a case-by-case MACT permit requirement issued by the Division pursuant to Paragraph (j) of 42 U.S.C. Section 7412, as amended."

The emergency engines are subject to 40 CFR Part 63, Subpart ZZZZ and are thus exempt from state-only toxic air pollutant (TAP) regulation.

The dryer system, hammermills, and pellet coolers are subject to case-by-case MACT 40 CFR Part 63, Subpart B (15A NCAC 02D .1112 112(g)) and are also exempt from state-only TAP regulation. Facility-wide TAP emissions are from MACT affected sources.

As seen in Table 5 above, hexachlorodibenzo-p-dioxin had the greatest impact at 13% of the AAL. This impact does not pose an unacceptable risk to human health. Even though the modeling included the previously proposed 205 MMBtu/hr dryer, the increase to 250.4 MMBtu/hr is not expected to increase the impact enough to pose an unacceptable health risk.

VI. Additional Impact Analysis

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

<u>Growth Impacts</u>
Enviva is expected to employ approximately 80 full-time people, most of which are expected to come from the existing local population. Therefore, this project is not expected to cause a significant increase in growth in the area.

<u>Soils and Vegetation</u>
The facility is located in the northern coastal plain of North Carolina. The local geography is flat with a mix of forests, agricultural crops, and herbaceous vegetation. By way of the NAAQS analyses of this submission, Enviva demonstrated that the impacts were below the established standards – both the primary and secondary NAAQS. The impacts were also below EPA established thresholds for soil and vegetation effects (described in detail in Section 6.3 and Table 6-1 of the modeling report). Thus, the Enviva project is not expected to cause any detrimental impacts to soils or vegetation in the area.

<u>CLASS II Visibility Impairment Analysis</u>
A Class II visibility impairment analysis was not conducted since there are not any visibility sensitive areas with the Class II Significant Impact Area.

Class I Area - Additional Requirements
There are three Federal Class I Areas within 300 km of the Enviva project – Swanquarter National Wilderness Area, James River Face Wilderness Area, and Cape Romain National Wilderness Area. The Federal Land Manager for each of those areas was contacted and none of them required any analysis; therefore, no analysis was conducted by the applicant.

CLASS I SIL Analysis

AERMOD was also used to estimate impacts for the Class 1 SIL analysis. Even though the distance to the closest Class 1 area, Swanquarter National Wilderness Area, exceeds 50 km, the threshold distance at which a long-range transport model is typically used, receptors were conservatively placed at 50 km from the Enviva facility. NO_2, $PM_{2.5}$, and PM_{10} all modeled below the EPA-established, CLASS 1 SILs, and thus no CLASS 1 increment modeling was required. The following table provides the results of SIL modeling.

Class 1 Significant Impact Results (ug/m^3)

Pollutant	Averaging Period	Max. Impact at 50 km	EPA SIL	% SIL
NO_2	Annual	0.008	0.1	8
PM_{10}	24-hr	0.166	0.32	52
	Annual	0.007	0.20	4
$PM_{2.5}$	24-hr	0.042	0.07	60
	Annual	0.003	0.06	5

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

VII. Permit Stipulations

A copy of the proposed DRAFT permit is included as Appendix A to this review.

VIII. Other

A. Public Notice Requirements – 40 CFR 51.166(q) requires that the permitting agency make available to the public a preliminary determination on the proposed project, including all materials considered in making this determination. With respect to this preliminary determination the NCDAQ:

- i) Will make available in the NCDAQ Fayetteville Regional Office and the NCDAQ Central Office in Raleigh, NC. all materials submitted, a copy of the preliminary determination, and all other information submitted and considered.
- ii) Will publish a public notice, by advertisement in a local paper including the preliminary decision and the opportunity for public comment.
- iii) Send a copy of the public notice to:
  - i. The applicant
  - ii. EPA Region IV for comment
  - iii. Officials having cognizance over the location of the location of the project as follows:
    - VII. Any affected state/local air agency – No other state or local agencies are expected to be affected by this project.
    - VIII. Chief Executives of the city and county in which the proposed project is to be located. Notices will be sent to the City Manager for the City of Clinton.
    - IX. Federal Land Manager – As noted above, the FLM for the closest Class I area did not request any analysis to be performed.

B. See Appendix C of this review for copies of the required notifications and public notices.

C. Other Regulatory Requirements

- An application fee of $13,837.00 is required and was received by DAQ.
- The appropriate number of application copies was received on September 3, 2014.
- The application included the Reduction and Recycling Form (A4).
- A Professional Engineer's Seal was included in the application (ref. M. Dale Overcash, P.E. Seal No. 12627).
- Receipt of the request for a zoning consistency determination was acknowledged by Mary M. Rose., Clinton-Sampson Planning Department on September 9, 2013.

- IBEAM Emission Source Module (ESM) update was verified on October 2, 2014.
- According to the application, the facility does not handle any of the substances subject to 112(r).
- The application was signed by Mr. Norb Hintz, Senior Vice President and Chief Engineer on August 22, 2014.

IX. Conclusion

Based on the application submitted and the review of this proposal, the NCDAQ made the preliminary determination available for comment. The comment period expired on October 29, 2014.

A comment was received on October 29, 2014 from Southern Environmental Law Center (SELC) regarding applicability of State Environmental Policy Act (SEPA) to this project. On October 30, 2014, DAQ requested that the applicant provide reasoning as to why the project is or is not subject to SEPA. On November 13, the Responsible Official provided the following response:

> "North Carolina's State Environmental Policy Act ("SEPA") does not apply to Enviva's proposed Sampson County pellet mill for the following reasons.
>
> SEPA applies if each of the following triggers are met:
>
> - An action by a state agency (such as land and money appropriations, awarding grants, issuing permits, or granting licenses); and
> - An expenditure of public monies or private use of state land (or waters); and
> - A potential detrimental environmental effect upon natural resources, public health and safety, natural beauty, or historical or cultural elements, of the state's common inheritance.
>
> N.C. Gen. Stat. 113A-4(2); 1 N.C. Admin. Code 25 .0108(a).
>
> The Sampson project arguably does not trigger the third element above, and it certainly does not trigger the second element. There are no expenditures of public monies or private use of state land (or waters) associated with this project. While Enviva is receiving county and state incentive money for building the plant and creating jobs, in 2010 the NC General Assembly passed legislation clarifying the circumstances under which SEPA applies to private sector projects receiving state and local incentives.
>
> SL 2010-186 provides that no environmental document shall be required in connection with:
>
> "A project for which public monies are expended if the expenditure is solely for the payment of incentives pursuant to an agreement that makes the incentive payments contingent on prior completion of the project or activity, or completion on a specified timetable, and a specified level of job creation or new capital investment."
>
> Enviva's incentives meet this exclusion."

Ms. Lyn Hardison, North Carolina Environmental Assistance and SEPA Coordinator was contacted on November 14, 2014. The attached e-mails pertaining to SEPA provide further clarification on non-applicability (ref. A. McConnell and L. Hardison; Nov. 13, 14). DENR General Council agrees that SEPA does not apply and recommends issuance of the permit (ref. J. Evans, Nov. 13 e-mail).

After consideration of all comments, a final determination is made to issue the proposed permit.

APPENDIX A

DRAFT PERMIT

APPENDIX B

PUBLIC NOTICE

APPENDIX C

LISTING OF ENTITIES AND ASSOCIATED MATERIALS

NEWSPAPER	Ms. Brenda McCullen Sampson Independent 303 West Elizabeth Street Clinton, NC 28328 (910) 249-4610 bmccullen@civitasmedia.com	Public Notice
OFFICIALS	Mr. Edwin Causey Manager, Sampson County 406 County Complex Road Clinton, NC 28328 (910) 592-6308	Public Notice
SOURCE	Mr. Michael Doniger Director, Centers for Excellence Enviva Pellets Sampson, LLC 7200 Wisconsin Avenue, Suite 1000 Bethesda, MD 20814 (703) 380-9957	Preliminary Determination, Draft Permit & Public Notice
EPA	Ms. Heather Ceron Air Permits Section U.S. EPA Region 4 Sam Nunn Atlanta Federal Building 61 Forsyth Street, S.W. Atlanta, Georgia 30303-3104 (404) 562-9185	Preliminary Determination, Draft Permit & Public Notice
	Preliminary Determination, Draft Permit, and Public Notice, via electronic mail to: ceron.heather@epa.gov with cc to lorinda.sheppard@epa.gov	
FLM	Ms. Jill Webster Branch of Air Quality 7333 W. Jefferson Avenue, Suite 375 Lakewood, CO 80235-2017 (303) 914-3804	None
FAYETTEVILLE REGIONAL OFFICE	Mr. Steven Vozzo NC DAQ Air Quality Regional Supervisor Systel Building 225 Green Street, Suite 714 Fayetteville, NC 28301 (910) 433-3361	Preliminary Determination, Draft Permit & Public Notice

ATTACHMENT

Hi,

Thank you for your time this morning to discuss the information that Enviva's consultant provided. I spoke to Mr. McConnell again after our conference call to inquire where the Natural Gas Line would be laid and he said that the line would be installed within the ROW. So based on all the information provided and Session Law 2010-186, the proposed project is not subject the NC Environmental Policy Act. I would suggest you consult with DENR's General Counsel for the final decision.

If I can be of further service, please let me know,

Thanks,
Lyn

Lyn Hardison lyn.hardison@ncdenr.gov
Environmental Assistance and SEPA Coordinator
NCDENR Division of Environmental Assistance & Customer Services (DEACS)
Washington Regional Office
943 Washington Square Mall
Washington, NC 27889
Phone: 252-948-3842
Fax: 252-975-3716
DEACS.NCDENR.gov

From: McConnell, Alan [mailto:AMcConnell@kilpatricktownsend.com]
Sent: Thursday, November 13, 2014 4:06 PM
To: Hardison, Lyn
Cc: Willets, William
Subject: Enviva Sampson County

In 2010, the General Assembly passed legislation changing the circumstances under which SEPA applies to private sector projects receiving state and local incentives. SL 2010-186 provides that no environmental document shall be required in connection with:
A project for which public monies are expended if the expenditure is solely for the payment of incentives pursuant to an agreement that makes the incentive payments contingent on prior completion of the project or activity, or completion on a specified timetable, and a specified level of job creation or new capital investment.
To be exempt from SEPA, incentive payments must be contingent on the following conditions: (i) completion of the project, or completion on a specified timetable; and (ii) a specified level of job creation or new capital investment.
Pursuant to an Incentive Agreement between Enviva and Sampson County, Enviva would receive the following incentives in exchange for locating the manufacturing facility in Sampson County:
a) A County real and personal property tax grant back incentive payment (GBI), payable in the form of a cash payment paid annually during the first ten (10) years of the Facility's operations, totaling fifty percent (50%) of the real and personal property taxes paid on this Facility during each year of the first ten (10) years of the plant's operations.
These payments shall be made starting in the first year after the year in which the Occupancy Date of the Facility occurs, and each year thereafter for the next ten (10) years (the "Incentive Period"), provided that the Company has not abandoned manufacturing operations in the Facility as defined in Article V herein.
b) A GBI cash payment payable in Year 1 and Year 2, which is utilized to fully reimburse the Company for site development costs totaling $523,425.00. This total reimbursable amount includes the following site development costs: purchase price of the forty-two (42) acre buffer property owned by Southern Produce Distributors, Inc. (the "Buffer Property") in an amount equal to $475,000; an interest payment relating to the Buffer Property in the amount of $24,925.00; site survey costs in the amount of $10,000.00; and wetland consultant costs in the amount of

$13,500.00. These site development costs will only be reimbursed by the County after the Company provides adequate documentation the cost were actually paid by the Company or an Affiliate.

c) In the event that the Company purchases the Buffer Property, upon being reimbursed for this cost by the County, the Company shall deed the County the twenty-two (22) acres of the Buffer Property located on the north side of the power line easement adjacent to the County owned property.

d) A GBI cash payment payable during the Incentive Period in an amount equal to$ 176,874.00 which is intended to reimburse the Company for construction costs relating to a natural gas line for the Facility. This payment is contingent upon the Company signing a contract to purchase gas from Piedmont Natural Gas and the Company providing the County documentation of expenditures of at least $176,874.00 towards the construction of a natural gas line at the Facility.

Enviva would also receive $755,650 in state tax refunds thru 2026.

The Incentive Agreement provides the following "performance conditions" for incentives under the Agreement:

- Enviva creates and maintains in the facility for the "incentive period" 79 full-time equivalent employees with an average salary no less than $36,862 per year.
- Enviva makes an initial direct investment of $117,000,000, and this value remains as taxable property in the County subject to ad valorem tax assessments for the full incentive period.

A key term is "incentive period." This is defined as "the first year after the year in which the Occupancy Date of the Facility occurs, and each year thereafter for the next ten (10) years." "Occupancy Date" means the date on which the Company assumes Beneficial Occupancy, which is defined to mean "the date on which the Company occupies the Facility for its intended purpose and hires one or more Full Time Equivalent Employees who will work in the Facility." In other words, the Incentive Period begins after construction of the facility is complete.

Thus, the performance conditions meet the conditions set forth in SL 2010-186. The incentive payments are contingent on the following conditions: (i) completion of the facility; and (ii) a specified level of job creation and new capital investment.

CENTRAL OFFICE PERMIT TRACKING SLIP

Facility Name: Enviva Pellets Sampson, LLC **Facility/Application ID:** 8200152.14B

County/Regional Office: Sampson/FRO **Engineer:** Kevin Godwin

Send Regional Office Copy of Application: ○ Yes ◉ No

10386

PART I - ACCEPTANCE CHECKLIST

Acknowledgement Letter: ○ Already Sent ◉ Please Send

Initial Event(s): ☑ TV-Ack./Complete ☐ State Ack. Letter due
☐ TV-Ack./Incomplete add info ☐ State App. not accepted – add info request

Fee Information:

Amount Due:
- ☒ PSD or NSR/NAA $~~14,072~~ 13,837
- ☐ PSD and NSR/NAA $27,369
- ☐ TV Greenfield $ 9,295
- ☐ TV $ 904
- ☐ Ownership Change $60, $50, $25
- ☐ Renewal/Name Change – NA

Initial Amount Received: $13,837 received with
~~Additional Amount Due:~~ app. 8200152.14A on 9/12/13

Acceptance Check List:

	Yes	No	N/A
Appropriate Number of Apps Submitted # Received______, #Needed______	☑	☐	☐
Application Fee Submitted	☑	☐	☐
Zoning Addressed	☑	☐	☐
Authorized Signature	☑	☐	☐
PE Seal	☑	☐	☐
Request for Confidentiality	☐	☑	
Application Contains Toxics Modification(s)	☑	☐	☐

PART II - IBEAM UPDATES

Application Type:
- ☐ Additional Permit
- ☐ Administrative Amendment
- ☐ Appeal
- ☑ Greenfield Facility
- ☐ Last GACT/Toxics
- ☐ Last MACT/Toxics
- ☐ Modification
- ☐ Name Change
- ☐ New Permit
- ☐ Ownership Change
- ☐ Renewal
- ☐ Renewal w/Modification

Permit Application Schedule:
- ☐ Appeal
- ☐ Expedited State
- ☑ PSD
- ☐ Director Administrative Amendment
- ☐ State
- ☐ TV – State Only
- ☐ TV – Expedited
- ☐ TV – Greenfield
- ☐ TV – Reopen for Cause
- ☐ TV – Administrative
- ☐ TV – Ownership Change
- ☐ TV – 502(b)(10)
- ☐ TV – Minor
- ☐ TV – Renewal
- ☐ TV – Significant (2Q .0501(c)(2))
- ☐ TV – Significant
- ☐ TV – 1st Time

PART III - COMPLETENESS CHECKLIST

- ☑ Required Application Forms Submitted and Completed
- ☑ Supporting Materials & Calculations Received
- ☑ PE Seal (If 15A NCAC 2Q .0112)
- ☑ Modeling Protocol Acceptance
- ☑ Confirmation of Pollutants Modeled
- ☐ E5 Form (Significant Modifications)

PART IV - GENERAL COMMENTS

PART V - SUPERVISOR REVIEW CHECKLIST

TVEE Updated (by Engineer): KTG 9-29-14 TVEE Verified: JB 10/2/14 Supervisor:______ Chief: WW 11/17/2014

PART VI - CLOSEOUT INFORMATION

Regulations Applicable to This Application (indicate all new regulations):
- ☑ NESHAPS/MACT
- ☐ NESHAPS/GACT
- ☑ NSPS
- ☐ 2D .1100
- ☐ 2Q .0711
- ☐ 2Q .0705 Last MACT/Toxics
- ☑ PSD/NSR
- ☐ PSD/NSR Avoidance
- ☐ Existing Source RACT/LAER
- ☐ New Source RACT/LAER
- ☐ RACT Avoidance
- ☐ RACT/LAER Added Fee* *(Notify Connie Horne)*
- ☐ Toxics/Combustion Sources After 7/10/10
- ☑ SIP Regulations (list all new): 02D .0515, .0516, .0521

Permit Class Information

Before	After
☐ Small	☑ Title V
☐ Syn. Minor	
☐ Title V	
☐ Proh. Small	
☐ General	

HAP Major Status (after) ☑ Major ☐ Minor ☐ Not Determined
PSD or NSR Status (after) ☑ Major ☐ Minor

Miscellaneous ☐ Multiple Permits at Facility ☐ Multi-Site Permit ☐ Recycled Oil Condition

Permit Dates Issue: 11-17-14 Effective: 11-17-14 Expiration: 10-31-19

IBEAM Closed Out By: KG Permit Number: 10386 Revision Number: R00

☑ Public Notice Published ☑ Public Notice Affidavit (if not noticed via DAQ Website)

Document Manager Updated by Engineer:______ Date:______

RC 4 11/17 Mailed Permit, CJ Mailed 11/20/14 Cathy FRO/Shannon/Connie Horne, letter

Tracking Slip ... cjh 6/17/13

Project Name:	ENVIVA PELLETS SAMPSON, LLC
Review Engineer:	KEVIN GODWIN

PSD Application Processing Checklist		
Activity	**Complete Date**	**Comment**
1. PreApplication Requirements		
Pre-Application Meeting		
Call FLM		
Letter to FLM • Confirm non interest ✓ • Request evaluation protocols and thresholds		
2. Initial Distribution		
Administrative completeness Letter	9-11-13	
Copy to EPA Region 4	9-11-13	
Copy to Regional Office	9-11-13	
Copy to Modeling Staff	9-11-13	
Copy to Federal Land Manager (if they request)	N/A	
3. PSD Requirements		
PSD Completeness Determination (30 days of receipt) Permits Chief MUST sign this letter		
Preliminary Determination	9-19-14	
Draft Permit	9-19-14	
4. Public Notice		
Prepare Public Notice	9-26-14	
Letter to Newspaper With Public Notice	9-26-14	
Letter to Local Government Official With Public Notice	"	
Letter to Applicant With Public Notice, Draft Permit & Preliminary Determination	"	
Letter to EPA Region 4 With Public Notice, Draft Permit & Preliminary Determination	"	
Letter to Regional Office With Public Notice, Draft Permit & Preliminary Determination	"	

Post to DAQ Website Public Notice, Draft Permit & Preliminary Determination	"	
Letter to Federal Land Manager (if they request) With Public Notice, Draft Permit & Preliminary Determination	N/A	
5. Public Hearing (if required)		
Notice of Hearing	N/A	
Letter to Applicant		
Letter to local government		
Letter to Newspaper		
Post on DAQ Website		
6. Permit Issuance		
Review EVERY public comment – No Obligation to provide written response but must consider every comment (case-by-case response)	10-29-14	
Final Determination	11-14-14	
Letter from Director approving or denying application (if required)		
Final Permit	11-14-14	
7. Distribution of Final Permit		
Copy to Source		
Copy to Regional Office		
Copy to EPA Region 4		
Copy to FLM if they request		
Post to PSD website		
8. Final Copies		
Ensure copy of all materials are sent to Central Files		
Maintain full copy of all materials in an official PSD binder for Permit staff retention		

Godwin, Kevin

From: Hardison, Lyn
Sent: Friday, November 14, 2014 1:54 PM
To: Willets, William; Godwin, Kevin; Cuilla, Mark
Subject: FW: Enviva Sampson County

Hi,

Thank you for your time this morning to discuss the information that Enviva's consultant provided. I spoke to Mr. McConnell again after our conference call to inquire where the Natural Gas Line would be laid and he said that the line would be installed within the ROW. So based on all the information provided and Session Law 2010-186, the proposed project is not subject the NC Environmental Policy Act. I would suggest you consult with DENR's General Counsel for the final decision.

If I can be of further service, please let me know,

Thanks,
Lyn

Lyn Hardison lyn.hardison@ncdenr.gov
Environmental Assistance and SEPA Coordinator
NCDENR Division of Environmental Assistance & Customer Services (DEACS)
Washington Regional Office
943 Washington Square Mall
Washington, NC 27889
Phone: 252-948-3842
Fax: 252-975-3716
DEACS.NCDENR.gov

From: McConnell, Alan [mailto:AMcConnell@kilpatricktownsend.com]
Sent: Thursday, November 13, 2014 4:06 PM
To: Hardison, Lyn
Cc: Willets, William
Subject: Enviva Sampson County

In 2010, the General Assembly passed legislation changing the circumstances under which SEPA applies to private sector projects receiving state and local incentives. SL 2010-186 provides that no environmental document shall be required in connection with:
A project for which public monies are expended if the expenditure is solely for the payment of incentives pursuant to an agreement that makes the incentive payments contingent on prior completion of the project or activity, or completion on a specified timetable, and a specified level of job creation or new capital investment.
To be exempt from SEPA, incentive payments must be contingent on the following conditions: (i) completion of the project, or completion on a specified timetable; and (ii) a specified level of job creation or new capital investment.

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2009

SESSION LAW 2010-186
SENATE BILL 778

AN ACT TO PROVIDE THAT AN ENVIRONMENTAL DOCUMENT UNDER THE STATE ENVIRONMENTAL POLICY ACT IS NOT REQUIRED IN CONNECTION WITH PROJECTS THAT RECEIVE PUBLIC MONIES IN THE FORM OF CERTAIN ECONOMIC INCENTIVES PAYMENTS.

The General Assembly of North Carolina enacts:

SECTION 1. G.S. 113A-12 reads as rewritten:

"**§ 113A-12. Environmental document not required in certain cases.**

No environmental document shall be required in connection with:

(1) The construction, maintenance, or removal of an electric power line, water line, sewage line, stormwater drainage line, telephone line, telegraph line, cable television line, data transmission line, or natural gas line within or across the right-of-way of any street or highway.

(2) An action approved under a general permit issued under G.S. 113A-118.1, 143-215.1(b)(3), or 143-215.108(c)(8).

(3) A lease or easement granted by a State agency for:

  a. The use of an existing building or facility.

  b. Placement of a wastewater line on or under submerged lands pursuant to a permit granted under G.S. 143-215.1.

  c. A shellfish cultivation lease granted under G.S. 113-202.

(4) The construction of a driveway connection to a public roadway.

(5) A project for which public monies are expended if the expenditure is solely for the payment of incentives pursuant to an agreement that makes the incentive payments contingent on prior completion of the project or activity, or completion on a specified timetable, and a specified level of job creation or new capital investment."

SECTION 2. This act becomes effective June 1, 2010, but does not apply to any pending litigation or orders issued by a court of competent jurisdiction prior to that date.

In the General Assembly read three times and ratified this the 10th day of July, 2010.

s/ Walter H. Dalton
President of the Senate

s/ Joe Hackney
Speaker of the House of Representatives

s/ Beverly E. Perdue
Governor

Approved 1:24 p.m. this 3rd day of August, 2010

S778-V-6

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450

601 WEST ROSEMARY STREET, SUITE 220
CHAPEL HILL, NC 27516-2356

Facsimile 919-929-9421

October 29, 2014

Received
OCT 31 2014
Air Permits Section

Via U.S. Mail and Electronic Mail

Kevin Godwin
Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641
kevin.godwin@ncdenr.gov

RE: Air Quality Permit No. 10386R00, Enviva Pellets Sampson, LLC, Sampson County, NC

Mr. Godwin,

Please accept the following brief comments submitted by the Southern Environmental Law Center ("SELC") regarding Air Quality Permit No. 10386R00 for Enviva Pellets Sampson, LLC's wood pellets facility in Sampson County near Faison, NC (hereinafter, "Sampson County pellets facility").[1] While we do not have any specific comments on the air permit at this time, we want to remind the Division of Air Quality of its legal obligations under the North Carolina Environmental Policy Act, N.C. Gen. Stat. § 113A-1, *et seq.* ("State Environmental Policy Act," or "SEPA"). The Sampson County pellets facility is subject to SEPA, and DAQ may not issue a permit until the SEPA process for the facility has been completed.

SEPA requires that State agencies assess the environmental impacts of projects that 1) involve the expenditure of public monies or use of public land, 2) involve state action (such as the issuing of permits), and 3) potentially affect North Carolina's environment. N.C. Gen. Stat. § 113A-4(2); 1 N.C. Admin. Code 25 .0108(a). Based on the information currently available to SELC, the Sampson County wood pellets facility satisfies all three criteria.

Before a legally required SEPA review is completed, "no DENR agency shall undertake in the interim any action which might limit the choice among alternatives or otherwise prejudice the ultimate decision on the issue." 15A N.C. Admin. Code 01C .0107(a). Therefore, a permit "shall not be approved until the final environmental document for the action is published in the Environmental Bulletin …." *Id.* Regarding the air permit for the Sampson County pellets

[1] SELC is a regional non-profit using the power of the law to protect the health and environment of the Southeast (Virginia, Tennessee, North and South Carolina, Georgia, and Alabama).

facility, DAQ "cannot take final action until the environmental document is completed and available for use as a decision-making tool." .0107(b).

In addition, as a DENR permitting agency, DAQ has the responsibility of notifying the applicant and other DENR agencies that SEPA applies to the project, and that final permitting action must await the completion of SEPA review. .0107(b), (c).

Because SEPA applies to the Sampson County pellets facility, we urge DAQ to not issue a final air permit until SEPA review is completed and the environmental impacts of the project, and closely-related projects in the region, are fully evaluated.

Thank you for your attention to these comments and please contact me at (919) 967-1450 or dcarter@selcnc.org if you have any questions.

Sincerely,

Received
OCT 31 2014
Air Permits Section

Derb S. Carter, Jr.
Director, Carolinas Office

Cc (via email):
Lyn Hardison, SEPA Environmental Coordinator, NC DENR
Crystal Best, State Environmental Review Clearinghouse, NC Department of Administration

AFFIDAVIT OF PUBLICATION

NORTH CAROLINA
Cumberland County

PUBLIC NOTICE

PUBLIC NOTICE ON PRELIMINARY DETERMINATION REGARDING APPROVAL OF AN APPLICATION SUBMITTED UNDER THE REGULATIONS PREVENTION OF SIGNIFICANT DETERIORATION

Enviva Pellets Sampson, LLC has applied to the North Carolina Department of Environment and Natural Resources, Division of Air Quality (DAQ) for approval of a project for installing a new wood pellets manufacturing facility. The facility will be located at

5 Connector Road
Faison, NC

The project is subject to review and processing under the North Carolina Administrative Code, Title 15A, Environment Management Subchapter 2D Section .0530 "Prevention of Significant Deterioration" and Subchapter 2Q Section .0300 "Construction and Operation Permits".

The permit application has been reviewed by the DAQ, Air Permitting Section, Raleigh, North Carolina, to determine compliance with the requirements of the North Carolina Environmental Management Commission's air pollution regulations.

A preliminary review, including analysis of the impact of the facility emissions on local air
quality, has led to the determination that the project can be approved, and the DAQ air permit issued, if certain permit conditions are met.

Sampson County is classified as an attainment area for National Ambient Air Quality Standards for all criteria pollutants. Compliance with all ambient air quality standards and PSD increments are expected.

Persons wishing to submit written comments or request a public hearing regarding the Air Quality Permit are invited to do so. Requests for a public hearing must be in writing and include a statement supporting the need for such a hearing, an indication of your interest in the facility, and a brief summary of the information intended to be offered at such hearing.

Written comments or requests for a public hearing should be postmarked no later than October 29, 2014 and addressed to Kevin Godwin, Division of Air Quality, 1641 Mail Service Center, Raleigh, North Carolina 27699-1641.

All comments received prior to this date will be considered in the final determination regarding the Air Quality Permit. A public hearing may be held if the Director of the DAQ determines that significant public interest exists or that the public interest will be served.

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

NC DENR
Division of Air Quality
Air Permitting Section
217 West Jones Street
Raleigh, NC 27603

or

Fayetteville Regional Office
225 Green Street, Suite 714
Fayetteville, NC 28301

Information on the draft permit, the permit application, and the staff review is available by writing or calling:

William D. Willets, P.E.,
Chief, Permitting Section
Division of Air Quality, NCDENR
1641 Mail Service Center
Raleigh, NC 27699-1641
william.willets@ncdenr.gov
(919) 707-8726

Sheila C. Holman
Director

9/29 4363836

Before the undersigned, a Notary Public of said County and state, duly commissioned and authorized to administer oaths, affirmations, etc., personally appeared. CINDY L. OROZCO
Who, being duly sworn or affirmed, according to law, doth depose and say that he/she is LEGAL SECRETARY
of THE FAYETTEVILLE PUBLISHING COMPANY, a corporation organized and doing business under the Laws of the State of North Carolina, and publishing a newspaper known as the FAYETTEVILLE OBSERVER, in the City of Fayetteville, County and State aforesaid, and that as such he/she makes this affidavit; that he/she is familiar with the books, files and business of said Corporation and by reference to the files of said publication the attached advertisement of CL Legal Line
PUBLIC NOTICE / ENVIVA PELLETS SAMPSON, LLC / NEW MANUFACTURING FACILITY
of NC DENR/DAQ/BUDGET OFFICE
was inserted in the aforesaid newspaper in space, and on dates as follows:

9/29/2014

and at the time of such publication The Fayetteville Observer was a newspaper meeting all the requirements and qualifications prescribed by Sec. No. 1-597 G.S. of N.C.

The above is correctly copied from the books and files of the aforesaid corporation and publication.

Cindy L Orozco

LEGAL SECRETARY
Title

Cumberland County, North Carolina

Sworn or affirmed to, and subscribed before me, this 29 day of September, A.D., 2014.

In Testimony Whereof, I have hereunto set my hand and affixed my official seal, the day and year aforesaid.

Pamela H Walters
Pamela H. Walters, Notary Public

My commission expires 5th day of December, 2015.

MAIL TO: NC DENR/DAQ/BUDGET OFFICE
1641 MAIL SERVICE CENTER, ,
RALEIGH, NC 27699-0000

0004363836

Received
OCT 14 2014
Air Permits Section

NCDENR

North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

September 26, 2014

Mr. Edwin Causey
Manager, Sampson County
406 County Complex Road
Clinton, NC 28328

Dear Mr. Causey:

SUBJECT: Preliminary Determination and Air Permit Application Review
Enviva Pellets Sampson, LLC
Faison, North Carolina, Sampson County
Facility ID 8200152, Application No. 8200152.14B
Draft Air Quality Permit No. 10386R00

Enviva Pellets Sampson, LLC has applied to the North Carolina Department of Environment and Natural Resources, Division of Air Quality, for approval of a Prevention of Significant Deterioration (PSD) project for installing a wood pellet manufacturing facility.

The proposed project is subject to review under the North Carolina Administrative Code, Title 15A, Environment Management Subchapter 2D Section .0530 "Prevention of Significant Deterioration" and Subchapter 2Q Section .0300 "Construction and Operation Permits". The regulation in Subchapter 2D Section .0530 requires that a public notice be published in a newspaper that serves the area and that local officials are informed of this project. A copy of the public notice, which will be published in the Fayetteville Observer on September 29, 2014, is enclosed for your information.

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CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)
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Total Postage & Fees	$

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Sent To

Street, Apt. No.; or PO Box No.

City, State, ZIP+4

PS Form 3800, August 2006 — See Reverse for Instructions

If you wish to make any comments on this project, you should submit them in writing within thirty (30) days of the date of public notice. If you have any questions regarding this matter, please contact Kevin Godwin, of my staff in Raleigh at (919) 707-8480.

Sincerely yours,

Kevin T. Godwin for

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

Enclosure

PUBLIC NOTICE

PUBLIC NOTICE ON
PRELIMINARY DETERMINATION
REGARDING APPROVAL OF AN APPLICATION
SUBMITTED UNDER THE REGULATIONS
PREVENTION OF SIGNIFICANT DETERIORATION

Enviva Pellets Sampson, LLC has applied to the North Carolina Department of Environment and Natural Resources, Division of Air Quality (DAQ) for approval of a project for installing a new wood pellets manufacturing facility. The facility will be located at

5 Connector Road
Faison, NC

The project is subject to review and processing under the North Carolina Administrative Code, Title 15A, Environment Management Subchapter 2D Section .0530 "Prevention of Significant Deterioration" and Subchapter 2Q Section .0300 "Construction and Operation Permits".

The permit application has been reviewed by the DAQ, Air Permitting Section, Raleigh, North Carolina, to determine compliance with the requirements of the North Carolina Environmental Management Commission's air pollution regulations.

A preliminary review, including analysis of the impact of the facility emissions on local air quality, has led to the determination that the project can be approved, and the DAQ air permit issued, if certain permit conditions are met.

Sampson County is classified as an attainment area for National Ambient Air Quality Standards for all criteria pollutants. Compliance with all ambient air quality standards and PSD increments are expected.

Persons wishing to submit written comments or request a public hearing regarding the Air Quality Permit are invited to do so. Requests for a public hearing must be in writing and include a statement supporting the need for such a hearing, an indication of your interest in the facility, and a brief summary of the information intended to be offered at such hearing.

Written comments or requests for a public hearing should be postmarked no later than October 29, 2014 and addressed to Kevin Godwin, Division of Air Quality, 1641 Mail Service Center, Raleigh, North Carolina 27699-1641.

All comments received prior to this date will be considered in the final determination regarding the Air Quality Permit. A public hearing may be held if the Director of the DAQ determines that significant public interest exists or that the public interest will be served.

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

NC DENR Division of Air Quality Air Permitting Section 217 West Jones Street Raleigh, NC 27603	or	Fayetteville Regional Office 225 Green Street, Suite 714 Fayetteville, NC 28301

Information on the draft permit, the permit application, and the staff review is available by writing or calling:

William D. Willets, P.E., Chief, Permitting Section
Division of Air Quality, NCDENR
1641 Mail Service Center
Raleigh, NC 27699-1641
william.willets@ncdenr.gov
(919) 707-8726

Sheila C. Holman
Director

Godwin, Kevin

From: Dale Overcash [DOvercash@trinityconsultants.com]
Sent: Tuesday, September 16, 2014 9:43 AM
To: Godwin, Kevin
Cc: Alan McConnell; Michael Doniger; Joe Harrell ; Gina Hicks; Jonathan Hill
Subject: Enviva Sampson Draft Permit - Updates and Comments
Attachments: Enviva-Sampson-PSDp - Enviva Updates from Sept 2014 Application - 9-16-14.docx

Kevin,

Per your request from yesterday, please find an updated draft permit. I have included updates based on our recent application. I have added those using Track Changes.

Additionally and based on our calls this morning I have added comments per your suggestion to the draft permit as a reminder for DAQ to re-address the following:

1. Does Enviva need to perform efficiency testing on the WESP per permit condition No. 2.1-A.1.b. Please also see my comments in the permit.
2. It is our opinion that NC air toxics should be removed from the permit. As we discussed, we request that you discuss this with William, Mark, and Rahul. Please also see my comments in the permit.
3. I have re-inserted the language for GHG compliance in Condition No. 2.2-A.2.e. (in my updated version).
4. The portable chipper (or backup chipper) is no longer part of the project.

If you have any questions regarding the above comments or if DAQ has any concerns with our requests, please advise ASAP so that we can discuss the issues with DAQ.

Do you know when we will see a final draft permit? Please advise if you can.

In closing, if you have any other questions, please advise.

....

Dale Overcash, P.E.
Principal Consultant

Trinity Consultants
One Copley Parkway, Suite 310 | Morrisville, NC 27560

Office: **919-462-9693** | Mobile: 919-274-3064
Email: dovercash@trinityconsultants.com |

The information transmitted is intended only for the person or entity to which it is addressed and may contain confidential and/or privileged material. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient is prohibited. If you received this in error, please contact the sender and delete the material from any computer.

Received
SEP 17 2014
Air Permits Section

DIVISION OF AIR QUALITY
September 11, 2014

MEMORANDUM

TO: Kevin Godwin, Environmental Engineer, Air Quality Permitting Section

FROM: Tom Anderson, Meteorologist II, Air Quality Analysis Branch (AQAB)

THROUGH: Mark Cuilla, Supervisor, AQAB

SUBJECT: Review of Dispersion Modeling Analysis – Enviva Pellets Sampson, LLC
Faison, NC Sampson County

Attached is a discussion of the modeling analysis for Enviva Pellets Sampson, LLC that was conducted in support of the construction and operation of a new facility near Faison, NC. The modeling was conducted in accordance with current PSD directives and modeling guidance. An initial modeling analysis was conducted and approved by the AQAB in June 2014; however, the heat input value for the burner on the WESP has increased slightly, triggering review of carbon monoxide (CO). Emission rates for other pollutants also increased marginally and some stack parameters also changed. As a result, a revised analysis was conducted for the proposed facility.

A summary of the modeling results is presented in Table 7.

c: Mark Cuilla
Tom Anderson

ENVIVA PELLETS SAMPSON LLC, PREVENTION OF SIGNIFICANT DETERIORATION (PSD) AIR DISPERSION MODELING ANALYSIS

Introduction

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

A summary of the modeling results is presented in the last topic, PSD Air Quality Modeling Results Summary. A detailed description of the modeling and modeling methodology is described below.

Project Description / Significant Emission Rate (SER) Analysis

Enviva Pellets Sampson, LLC (Enviva) plans to construct and operate a wood pellet manufacturing plant in Sampson County near Faison, NC. Operations are expected to occur 24 hours per day, 7 days per week and 52 weeks per year. A facility-wide pollutant netting analysis was accomplished and documented in Table 3-1 of the Enviva permit application. Six pollutants were declared to exceed their PSD Significant Emission Rate (SER) and thus require a PSD analysis. These emission rates are provided in the table below.

Table 1 - Pollutant Netting Analysis

Pollutant	Annual Emission Rate (tons/yr)	Significant Emission Rate (tons/yr)	PSD Review Required?
NO_2	220.17	40	Yes
PM_{10}	97.59	15	Yes
$PM_{2.5}$	59.13	15	Yes
TSP*	145.99	25*	Yes*
SO_2	27.42	40	No
CO	231.17	100	Yes
VOC's	606	40	Yes

*N.C. requirement only.

Preliminary Impact Air Quality Modeling Analysis

An air quality preliminary impact analysis was conducted for the pollutants exceeding the corresponding SER. The modeling results were then compared to applicable Significant Impact Levels (SILs) as defined in the NSR Workshop Manual to determine if a full impact air quality analysis would be required for that pollutant.

The Enviva facility will be located near Faison, NC, in Sampson County. The facility area is in the southeastern coastal plain with terrain being predominantly flat and is generally agricultural, industrial, and forest land. For modeling purposes, the area, including and surrounding the site, is classified rural, based on the land use type scheme established by Auer 1978.

Enviva evaluated the pollutants' significant emissions using the EPA AERMOD model and five years (2008-2012) of National Weather Service (NWS) surface (Fayetteville) and upper air (Greensboro) meteorological data. Full terrain elevations were included, as were normal regulatory defaults. Sufficient receptors were placed in ambient air beginning at the fenceline to establish maximum impacts. Emission rates for this specific project were used and the maximum impacts were then compared to the SIL. Since the results showed impacts above the SILs for PM_{10}, $PM_{2.5}$, and NO_2, further modeling was required for those pollutants. The SIL results are shown in Table 2.

Table 2 - Class II Significant Impact Results (ug/m^3)

Pollutant	Averaging Period	Facility maximum Impact	Class II Significant Impact Level	Significant Impact Distance (km)
CO	1-hour	49.65	2,000	N/A
	8-hour	38.35	500	
PM_{10}	annual	**4.62**	1	2.5
	24-hour	**34.84**	5	
$PM_{2.5}$	annual	**1.19**	.3	2.5
	24-hour	**7.45**	1.2	
NO_2	annual	**2.29**	1	3.0
	1-hour	**39.71**	10	

Class II Area Full Impact Air Quality Modeling Analysis

A Class II Area NAAQS and PSD increment analysis was performed for PM_{10}, $PM_{2.5}$, and

NO_2 to include offsite source emissions and background concentrations (NAAQS). Enviva used AERMOD with the modeling methodology as described above. Off-site source inventories for both increment and NAAQS modeling were obtained from NCDAQ and then refined by Enviva using the NCDAQ approved "Q/D=20" guideline. For the NO_2 NAAQS analysis, 6 offsite sources (all from the same facility) were used; the same sources were also used for the increment analysis. These sources, along with their emission rates, are provided in the attachments. For the PM_{10} and $PM_{2.5}$ NAAQS and increment analyses, no offsite sources were included since Enviva is the only facility to trigger review for those pollutants since their respective established baseline dates.

Enviva used an appropriate array of receptors beginning at the declared fenceline and extending outward to 5 kilometers. PM_{10} background concentrations were obtained from the Cumberland County PM_{10} monitoring station. The Duplin County monitor was used for $PM_{2.5}$ background concentrations. NO_2 background concentrations were obtained from a monitor located in Paulding County, GA since it was judged to be most representative of the rural NO_2 background concentrations for the Sampson County region. The modeling results are shown in Table 3 and indicate compliance with the NAAQS for PM_{10}, $PM_{2.5}$, and NO_2.

Table 3 - Class II Area NAAQS Modeling Results

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	Background Concentration (ug/m3)	Total Impact (ug/m3)	NAAQS (ug/m3)	% NAAQS
PM_{10}	24-hour	29.62	25.00	54.62	150	36
$PM_{2.5}$	24-hour	5.32	19.00	24.32	35	67
	annual	1.19	7.76	8.95	12	75
NO_2	1-hour	46.27	32.10	78.37	188	42
	annual	3.14	5.30	8.44	100	8

In the CLASS II increment analysis, Enviva used the same onsite sources, fenceline, and receptors as in the NAAQS analysis. The emission rates modeled are provided in the attachments. The Class II Area increment modeling results are shown in Table 4 and indicate compliance with the Class II Area increments.

Table 4 - Class II Area PSD Increment Modeling Results

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	PSD Increment (ug/m3)	% Increment
PM_{10}	24-hour	29.62	30	99
	annual	4.62	17	27
$PM_{2.5}$	24-hour	7.60	9	84
	annual	1.31	4	33
NO_2	annual	3.14	25	13

Non Regulated Pollutant Impact Analysis (North Carolina Toxics)

Enviva also modeled TSP and eight toxics using AERMOD with the same receptor array and meteorology as used in the NAAQS analysis. A list of the facility sources and emission rates used are attached to this document. All pollutants demonstrated compliance on a source-by-source basis with the NC's AAQS or Acceptable Ambient Level (AAL). The maximum concentrations as shown in Table 5 occurred along the fenceline.

Table 5 – Non-Regulated Pollutants Modeling Results

Pollutant	Averaging Period	Max Facility Impact (µg/m3)	AAL (µg/m3)	Percent of AAL
TSP	annual	10.5	75	14
	24-hr	74.1	150	49
Arsenic	annual	1.00e-5	2.3e-4	4
Benzo(a)pyrene	annual	2.00e-5	3.3e-2	< 1
Cadmium	annual	1.91e-6	5.5e-3	< 1
Chlorine	1-hour	0.13	900	< 1
	24-hour	5.5e-02	37.5	< 1
Formaldehyde	1-hour	6.32	150	4
Hexachlor.dioxin	annual	1.00e-5	7.6e-5	13

Hydrogen chloride	1-hour	0.31	700	< 1
Vinyl chloride	annual	1.20e-4	0.38	< 1

Additional Impacts Analysis

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

Growth Impacts

Enviva is expected to employ approximately 80 full-time people, most of which are expected to come from the existing local population. Therefore, this project is not expected to cause a significant increase in growth in the area.

Soils and Vegetation

The facility is located in the northern coastal plain of North Carolina. The local geography is flat with a mix of forests, agricultural crops, and herbaceous vegetation. By way of the NAAQS analyses of this submission, Enviva demonstrated that the impacts were below the established standards – both the primary and secondary NAAQS. The impacts were also below EPA established thresholds for soil and vegetation effects (described in detail in Section 6.3 and Table 6-1 of the modeling report). Thus, the Enviva project is not expected to cause any detrimental impacts to soils or vegetation in the area.

CLASS II Visibility Impairment Analysis

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

Class I Area - Additional Requirements

There are three Federal Class I Areas within 300 km of the Enviva project – Swanquarter

NWR, James River Face Wilderness, and Cape Romain National Wildlife Refuge. The Federal Land Manager for each of those areas was contacted and none of them required any analysis; therefore, no analysis was conducted by the applicant.

CLASS 1 SIL Analysis

AERMOD was also used to estimate impacts for the Class 1 SIL analysis. Even though the distance to the closest Class 1 area, Swanquarter NWR, exceeds 50 km, the threshold distance at which a long-range transport model is typically used, receptors were conservatively placed at 50 km from the Enviva facility. NO_2, $PM_{2.5}$, and PM_{10} all modeled below the EPA-established, CLASS 1 SILs, and thus no CLASS 1 increment modeling was required. Table 6 provides the results of SIL modeling.

Table 6 - Class 1 Significant Impact Results (ug/m^3)

Pollutant	Averaging Period	Max. Impact at 50 km	EPA SIL	% SIL
NO_2	Annual	0.008	0.1	8
PM_{10}	24-hr	0.166	0.32	52
	Annual	0.007	0.16	4
$PM_{2.5}$	24-hr	0.042	0.07	60
	Annual	0.003	0.06	5

PSD Air Quality Modeling Result Summary

Based on the PSD air quality ambient impact analysis performed the proposed Enviva Pellets Sampson, LLC facility will not cause or contribute to any violation of the Class II NAAQS, PSD increments, Class 1 Increments, or any FLM AQRVs. A summary of the modeling results is presented in Table 7.

Note: Tables follow below.

TABLE 7 – Enviva Pellets Sampson, LLC PSD AIR QUALITY MODELING RESULTS

SER Evaluation

Pollutant	Annual E/R (Tons)	SER (Tons/yr)					
NO_2	**220.17**	40					
PM_{10}	**97.59**	15					
$PM_{2.5}$	**59.13**	15					
TSP	**145.99**	25					
SO_2	**27.42**	40					
CO	**231.17**	100					
VOC's	**606**	40					

Class II Area SIL Analysis

Pollutant	Averaging Period	Maximum Impact (ug/m^3)	SIL (ug/m^3)	SIL Exceeded			
CO	1-hour	49.65	2,000	No			
	8-hour	38.35	500	No			
PM_{10}	annual	**4.62**	1	**Yes**			
	24-hour	**34.84**	5	**Yes**			
$PM_{2.5}$	annual	**1.19**	.3	**Yes**			
	24-hour	**7.45**	1.2	**Yes**			
NO_2	annual	**2.29**	1	**Yes**			
	1-hour	**39.71**	10	**Yes**			

Class II NAAQS Analysis

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	Back Ground Conc (ug/m^3)	Total Impact (ug/m^3)	NAAQS (ug/m^3)	% NAAQS
PM_{10}	24-hour	29.62	25.00	54.62	150	36
$PM_{2.5}$	24-hour	5.32	19.00	24.32	35	67
	annual	1.19	7.76	8.95	12	75
NO_2	1-hour	46.27	32.10	78.37	188	42
	annual	3.14	5.30	8.44	100	8

Class II Increment Analysis						
Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (µg/m3)	PSD Increment (µg/m3)	% Increment		
PM_{10}	24-hour	29.62	30	99		
	annual	4.62	17	27		
$PM_{2.5}$	24-hour	7.60	9	84		
	annual	1.31	4	33		
NO_2	annual	3.14	25	13		

Class I Area SIL Analysis							
Pollutant	Averaging Period	Max. Impact at 50 km	EPA SIL	% SIL			
NO_2	Annual	0.008	0.1	8			
PM_{10}	24-hr	0.166	0.32	52			
	Annual	0.007	0.16	4			
$PM_{2.5}$	24-hr	0.042	0.07	60			
	Annual	0.003	0.06	5			

Non-Regulated Pollutant Analysis					
Pollutant	Averaging Period	Max Facility Impact (µg/m3)	AAL (µg/m3)	Percent of AAL	
TSP	annual	10.5	75	14	
	24-hr	74.1	150	49	
Arsenic	annual	1.00e-5	2.3e-4	4	
Benzo(a)pyrene	annual	2.00e-5	3.3e-2	< 1	
Cadmium	annual	1.91e-6	5.5e-3	< 1	
Chlorine	1-hour	0.13	900	< 1	
	24-hour	5.5e-02	37.5	< 1	
Mercury	24-hour	2.95e-4	0.6	< 1	
Nickel	24-hour	2.78e-3	6	< 1	
Phenol	1-hour	18.5	950	2	
Vinyl chloride	annual	1.15e-4	0.38	< 1	

Table 5-4. Modeled Source Locations

Model ID	Description	UTM-E (m)	UTM-N (m)	Elevation (m)
EP1	Dryer WESP Stack	756,748.6	3,890,256.1	51.91
EP2	Hammermill Filter #1 and #2	756,691.4	3,890,157.1	52.07
EP3	Hammermill Filter #3 and #4	756,686.4	3,890,152.5	52.03
EP4	Hammermill Filter #5 and #6	756,680.0	3,890,147.1	52.02
EP5	Hammermill Filter #7 and #8	756,674.5	3,890,142.6	52.01
EP6	Pellet Silo Bin Vent	756,625.2	3,890,120.9	51.98
EP7	Pellet Cooler #1 Cyclone	756,618.9	3,890,100.4	51.96
EP8	Pellet Cooler #2 Cyclone	756,615.9	3,890,097.4	51.97
EP9	Pellet Cooler #3 Cyclone	756,612.2	3,890,093.8	51.98
EP10	Pellet Cooler #4 Cyclone	756,608.0	3,890,089.4	51.99
EP11	Pellet Cooler #5 Cyclone	756,604.3	3,890,086.0	51.99
EP12	Pellet Cooler #6 Cyclone	756,601.0	3,890,083.3	51.98
EP13	Emergency Generator	756,657.0	3,890,225.0	52.52
EP14	Firewater Pump	756,535.9	3,889,980.6	51.93
EP15	Fines Dust Bin Vent	756,700.3	3,890,164.4	52.13
EP16	Finished Goods Dust Collection Stack	756,537.0	3,890,036.0	51.94
EP17	Greenwood Hammermill #1 Bin Vent	756,728.3	3,890,272.4	51.93
EP18	Greenwood Hammermill #2 Bin Vent	756,729.6	3,890,266.6	51.94
EP19	Dryer Out Conv. Tail Bin Vent	756,720.0	3,890,215.0	52.13
EP20	Dryer Out Conv. Head Bin Vent	756,692.0	3,890,181.2	52.25
PAVEDRDS	Paved Roadway	756,731.0	3,889,783.5	51.97

Table 5-5. Modeled Stack parameters

Model ID	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
EP1	28.65	350.93	10.59	3.05
EP2	16.46	310.93	13.80	1.14
EP3	16.46	310.93	13.80	1.14
EP4	16.46	310.93	13.80	1.14
EP5	16.46	310.93	13.80	1.14
EP6	23.77	305.37	0.01	0.40
EP7	22.86	316.48	16.48	0.66
EP8	22.86	316.48	16.48	0.66
EP9	22.86	316.48	16.48	0.66
EP10	22.86	316.48	16.48	0.66
EP11	22.86	316.48	16.48	0.66
EP12	22.86	316.48	16.48	0.66
EP13	4.57	919.82	78.30	0.09
EP14	4.57	954.00	109.18	0.06
EP15	20.42	293.00	0.01	0.93
EP16	7.62	310.93	14.35	1.22
EP17	12.19	293.00	16.17	0.61
EP18	12.19	293.00	16.17	0.61
EP19	4.57	293.00	0.01	0.40
EP20	15.85	293.00	0.01	0.40

Table 5-7. Modeled Emission Rates

Model ID	Modeled Emission Rates (g/s)				
	TSP	PM_{10}	$PM_{2.5}$	CO	NO_x
EP1	1.48E+00	1.48E+00	1.48E+00	6.63E+00	6.31E+00
EP2	1.30E-01	1.30E-01	4.54E-04	-	-
EP3	1.30E-01	1.30E-01	4.54E-04	-	-
EP4	1.30E-01	1.30E-01	4.54E-04	-	-
EP5	1.30E-01	1.30E-01	4.54E-04	-	-
EP6	1.06E-02	1.06E-02	1.06E-02	-	-
EP7	2.85E-01	7.43E-02	9.11E-03	-	-
EP8	2.85E-01	7.43E-02	9.11E-03	-	-
EP9	2.85E-01	7.43E-02	9.11E-03	-	-
EP10	2.85E-01	7.43E-02	9.11E-03	-	-
EP11	2.85E-01	7.43E-02	9.11E-03	-	-
EP12	2.85E-01	7.43E-02	9.11E-03	9.05E-02	1.04E-01
EP13	1.04E-02	1.04E-02	1.04E-02	9.05E-02	1.04E-01
EP14	1.04E-02	1.04E-02	1.04E-02	-	-
EP15	4.23E-02	4.23E-02	4.23E-02	-	-
EP16	1.53E-01	1.40E-01	5.37E-04	-	-
EP17	4.32E-02	4.32E-02	4.32E-02	-	-
EP18	4.32E-02	4.32E-02	4.32E-02	-	-
EP19	4.32E-03	4.32E-03	4.32E-03	-	-
EP20	4.32E-03	4.32E-03	4.32E-03	-	-
PAVEDRDS*	9.87E-07	1.97E-07	4.85E-08	-	-

* Area source emission rates expressed per unit area ($g/s/m^2$)

Table 5-8. Modeled TAP Emission Rates

Model ID	Modeled TAP Emission Rates (g/s)							
	ARSENIC	BAP	CADMIUM	CHLORINE	FORM	HXCLPDXN	HCL	VNYLCHLR
EP1	4.12E-05	6.72E-05	7.68E-06	2.04E-02	5.58E-01	4.13E-05	4.91E-02	4.65E-04
EP2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00	0.00E+00	0.00E+00
EP3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00	0.00E+00	0.00E+00
EP4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00	0.00E+00	0.00E+00
EP6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-03	0.00E+00	0.00E+00	0.00E+00
EP7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-03	0.00E+00	0.00E+00	0.00E+00
EP8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-03	0.00E+00	0.00E+00	0.00E+00
EP9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-03	0.00E+00	0.00E+00	0.00E+00
EP10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-03	0.00E+00	0.00E+00	0.00E+00
EP11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.59E-03	0.00E+00	0.00E+00	0.00E+00
EP12	0.00E+00	4.15E-08	0.00E+00	0.00E+00	2.60E-04	0.00E+00	0.00E+00	0.00E+00
EP13	0.00E+00	4.15E-08	0.00E+00	0.00E+00	2.60E-04	0.00E+00	0.00E+00	0.00E+00

Table G-1. Modeled NO_x Inventory Sources

Model ID	Description	UTM-E (m)	UTM-N (m)	Elevation (m)	Emission Rate (g/s)	Stack Height (m)	Exit Temp. (k)	Exit Velocity (m/s)	Stack Diameter (m)
HFLEE1	IC Turbine 10/11	764,564.0	3,918,961.0	24.97	3.76E-01	30.48	878.71	48.77	5.39
HFLEE2	LEE IC Turbine 12/13	764,564.0	3,918,961.0	24.97	6.30E-01	30.48	878.71	48.77	5.39
HFLEE3	IC Turbine 2/3/4 Stack	764,564.0	3,918,961.0	24.97	2.27E-02	10.36	758.71	31.88	3.44
HFLEE4	Units 1&2 Stack	764,564.0	3,918,961.0	24.97	2.41E+01	91.44	410.93	27.43	4.11
HFLEE5	Unit 3 Boiler Stack	764,564.0	3,918,961.0	24.97	4.99E+01	91.44	421.48	40.60	5.79
HFLEE6	Unit 14	764,564.0	3,918,961.0	24.97	3.64E-01	30.48	878.71	48.77	5.39

Notes for DAQ Meeting on 9/3/14

Proposed attendees:

William Willets, Mark Cuilla, Kevin Godwin (via phone), Alan McConnell, Dale Overcash

This amended application includes the following changes:

1. Change the heat input of the dryer from 205 to 250.4 MMBTU/hr
2. Change the dry hammermill arrangement to have 8 hammermills, 8 cyclones, 8 baghouses and 4 stacks (2 baghouses to a stack)
3. Change the dust collection from the hammermill area to vent to the dry fines operation baghouse.

The above changes result in the following required upgrades to the application:

1. Re-calculate emissions for each of the above changes
2. Trigger PSD for CO from the dryer which requires the development of a BACT limit (0.21 lb/MMBTU) and modeling
3. A reevaluation of BACT for the dryer for PM, PM-10, PM-2.5, NOx & GHG
4. A change in the dryer filterable PM/PM-10/PM-2.5 BACT limit from 0.086 to 0.105 lb/ODT
5. An increase in the annual GHG BACT limit (TPY)
6. A reevaluation of BACT for PM, PM-10, and PM-2.5 for the dry hammermills and the dry fines operation (same BACT, but slight changes in lb/hr & TPY due to flow changes)
7. Updated modeling (NAAQS, Increment and air toxics) for all sources – air toxics evaluated qualitatively based on a discussion with DAQ
8. Update the other analyses (as required based on the updates as listed above)
9. Update DAQ application forms
10. Update and resubmittal of the application to DAQ

Godwin, Kevin

From: Dale Overcash [DOvercash@trinityconsultants.com]
Sent: Monday, July 21, 2014 1:27 PM
To: Godwin, Kevin
Cc: Joe Harrell ; Michael Doniger; Alan McConnell; Gina Hicks; Jonathan Hill
Subject: Enviva - Updated Information for the Sampson Application
Attachments: Enviva Sampson NC Revised Pages 7.18.2014.pdf

Kevin,

Please find updated pages for the most recent updates to the application. These updates address changes to the NOx and VOC emission rates. As such, the attached are as follows:

1. Updates to BACT for dryer NOx and VOC (Section 4);

2. Updated NOx and VOC calculations and plant emission summaries (Appendix B); and

3. Updates to the NOX and VOC BACT summaries (Appendix B).

We have included PDF copies of only the pages that have changed in the application.

If you have any questions, please advise.

....

Dale Overcash, P.E.
Principal Consultant

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ENVIVA PELLETS SAMPSON, LLC • SAMPSON COUNTY, NORTH CAROLINA

enviva

REVISED PSD AIR QUALITY CONSTRUCTION AND OPERATING PERMIT APPLICATION

Prepared By:

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July 2014

Project 143401.0031

Trinity Consultants

Environmental solutions delivered uncommonly well

4.4.1.2. Eliminate Technically Infeasible Options

Conventional SCR and Regenerative SCR: As discussed in the previous section, there are substantial technical concerns about poisoning/blinding of catalysts utilized within a conventional SCR system and our research indicates that there are no such systems operating on source similar to the wood-fired dryer burner system anywhere in the world. RSCR has not been demonstrated on a wood chip dryer in the past. Potential impacts of salts carry over from the WESP needed for particulate matter control may poison catalyst and, furthermore, the low temperate of the exhaust from the WESP (~170 °F) makes reheat necessary for appropriate catalyst operating temperature impracticable. Thus, both conventional SCR and RSCR are considered undemonstrated/technically infeasible technologies for wood dryers.

Despite questionable technical feasibility of SCR and RSCR, this analysis has nonetheless assumed for the purposes of this economic analysis that a SCR and RSCR system are technically feasible.

4.4.1.3. Rank Remaining Control Technologies by Effectiveness

There are three NO_x control technologies that have been considered technically feasible for the boilers – RSCR, conventional SCR, and SNCR.

4.4.1.4. Evaluate Most Effective Control Option (Impacts Analysis)

<u>4.4.1.4.1 RSCR (0.068 lb/MMBtu NO_x)</u>

<u>Economic Impacts</u>
A detailed cost evaluation of RSCR is included in Table D-1. As shown in Table D-4, a cost effectiveness of approximately $17,723 per ton of NO_x was estimated. This cost is considered prohibitive, and RSCR is therefore eliminated from further consideration in the BACT evaluation.

<u>Energy Impacts</u>
Energy requirements for a RSCR system consist primarily of the power needed for the fan and fan power to overcome catalyst pressure. It is estimated that the energy impact associated with it is approximately 2.80×10^6 KWH/yr. This value does not include the energy for re-heating the gas stream.

<u>Environmental Impacts</u>
There are no major adverse environmental impacts.

<u>4.4.1.4.2 SCR (0.068 lb/MMBtu NO_x)</u>

<u>Economic Impacts</u>
As presented in Tables D-2 and D-5, SCR can achieve an annual average NO_x level of 0.068lb/MMBtu at approximately $23,759/ton of NO_x reduction. This cost is considered prohibitive, and SCR is therefore eliminated from further consideration in the BACT evaluation.

<u>Energy Impacts</u>
Energy requirements for an SCR system primarily consist of the power needed for ammonia injection. It is estimated that the energy impact associated with SCR control is approximately 2.54×10^4 KWH/yr.

<u>Environmental Impacts</u>
There are no major adverse environmental impacts.

4.4.1.4.3 SNCR (0.150 lb/MMBtu)

After discussions between Enviva and a major SNCR vendor, and some testing of the efficiency of an SNCR on an average basis, an SNCR control option of 0.150 lb/MMBtu was determined to be an achievable emission rate due to inherent limitations on the effectiveness of this control device in the proposed burner system.

Economic Impacts

As shown in Tables D-3 and D-4, the SNCR can achieve a NO_x level of 0.150lb/MMBtu at approximately $3,501/ton of NO_x reduction. This cost is not considered cost effective given the negligible impact of the dryer on air quality. As discussed in Section 5, the maximum modeled one-hour average concentration for nitrogen dioxide (NO_2) is only 65.1 $\mu g/m^3$ (including a background of 32.1 $\mu g/m^3$), which is approximately 35% of the NAAQS. The maximum dryer contribution is only 16.6 $\mu g/m^3$ at the maximum receptor.

Energy Impacts

Energy requirements for an SNCR system primarily consist of the power needed for ammonia injection. It is estimated that the energy impact associated with SNCR control is approximately 2.8×10^4 KWH/yr.

Environmental Impacts

There are no major adverse environmental impacts.

4.4.1.5. Select BACT

The baseline emission rate proposed by the dryer vendor of 0.20 lb/MMBtu utilizing good combustion practices and low NOx burners is proposed as BACT.

4.4.2. Particulate Matter ($TSP/PM_{10}/PM_{2.5}$)

Particulate matter (TSP/PM_{10}) is emitted as both filterable and condensable particulate matter. Enviva has designed the rotary dryer system with three identical simple cyclones, considered the baseline level of control, for particulate matter removal.

4.4.2.1. Identify Control Technologies

Potentially applicable TSP/PM_{10} add-on control technologies (in addition to the base simple cyclones) are:

- Baghouse,
- Electrostatic Precipitator (ESP), and
- Wet Electrostatic Precipitator (WESP).

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

with an established VOC control efficiency over an extended period of time, this technology is not considered to be a feasible control technology.

Bio-oxidation / Bio-filtration: In the case of the bio-oxidation or bio-filtration, many questions still remain regarding the technology's efficacy to effectively remove VOC and HAP emissions at the Enviva plant.

To our knowledge, use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Due to the undemonstrated nature of this technology at a pellet manufacturing facility, it has been eliminated from further consideration in this BACT analysis.

Regenerative Catalytic Oxidation: There are no wood pellet manufacturing facilities using RCOs and operation of RCOs downstream of drying operations utilizing WESPs for particulate control, which will be used at this facility, are prone to major corrosion and catalyst fouling due to deposition of entrained salts and high operating temperatures. Due to operational problems and the undemonstrated nature of use of an RCO after a WESP in the wood pellets manufacturing industry, use of RCO control is rejected from further consideration.

4.4.3.3. Rank Remaining Control Technologies by Effectiveness

After eliminating the technically infeasible control options, Enviva has determined the following options remain and has ranked them in order of greatest to least control of VOC emissions:

- Regenerative thermal oxidation (RTO).

4.4.3.4. Evaluate Most Effective Control Option (Impacts Analysis)

4.4.3.4.1 Regenerative Thermal Oxidation (0.107 lb/ODT VOC)

Economic Impacts

Results of the economic impacts evaluation for operation of the RTO are presented in Tables D-7 and D-8. Capital and operating costs are based on vendor quotes, OAQPS Manual, and past permitting experience. Other cost impacts are estimated using EPA cost methodologies. Table D-7 presents a breakout of costs used in the economic impacts evaluation.

Capital Costs for the RTO are provided to Enviva by GEOENERGY. Economic Life of the RTO of 10 years was also supplied by the vendor, which is also consistent with Trinity experience.

As shown in Tables D-8, the cost-effectiveness of operation of the RTO is approximately $7,245/ton VOC, which is considered cost prohibitive, particularly when considering that operation of the unit will have negligible impact to ozone formation in this rural region of the state, which is "NOx limited."

Please also refer back to the discussion of the MDF plant in central NC that was previously mentioned above in Section 4.1.3. In that application, their cost effectiveness for a RTO based on actual costs and operating data was $5,283/ton. Enviva requests that DAQ consider the above referenced RTO cost data in its review of our application, not only for this drying operation, but also for the other VOC sources at our pellet manufacturing facility

Energy Impacts

The additional energy required to operate the RTO is about 5.2×10^6 KWH/yr.

Environmental Impacts

There are adverse impacts from the operation of an RTO in the form of increased emissions of criteria pollutants, particularly NO_x which can lead to increased formation of ozone in NO_x-limited regions like Sampson County, and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.4.3.4.2 Process Design (1.07 lb/ODT VOC)

There are no adverse economic, energy, or environmental impacts associated with designing the process to utilize at least 25% hardwood and incorporating a low temperature drying system. Use of hardwood has been used to establish baseline emissions and results in a VOC reduction compared to a traditional softwood mill.

4.4.3.5. Select BACT

Because RTO abatement technology is deemed to be cost prohibitive, the plant will utilize process design to minimize total VOC emissions to 1.07 lb/ODT on an annual average basis.

4.4.4. Greenhouse Gases (CO_2, CH_4, N_2O)

On July 1, 2011, EPA signed the Deferral for CO_2 Emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration (PSD) and Title V Programs to defer permitting of these sources for a three-year period. On July 12, 2013, federal appellate judges vacated EPA's deferral rule for the GHG permitting of biomass-fired units. On July 21, 2014, per 40 CFR Part 51.166(b)(48), the rule no longer allows the exclusion of CO_2 from review under PSD. Therefore, as discussed with NCDAQ, Enviva is providing a GHG BACT analysis for the wood dryer.

Since there will be a major emissions increase of GHGs from the wood-fired dryer, a BACT analysis for GHGs is being conducted on this unit. For a combustion unit, GHG emissions of CO, CH_4, and N_2O are anticipated as a result of the combustion processes; therefore, a BACT review must be conducted for CO_2e.

The U.S. EPA issued several new guidance documents related to the completion of GHG BACT analyses. The following guidance documents were utilized as resources in completing the GHG BACT evaluation for the proposed project:

- *PSD and Title V Permitting Guidance For Greenhouse Gases*, March 2011 (hereafter referred to as General GHG Permitting Guidance)[14]
- *Guidance For Determining Best Available Control Technology For Reducing Carbon Dioxide Emissions from Bioenergy Production*, (March 2011) (hereafter referred to as Bioenergy Permitting Guidance)[15]

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[14] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, (Research Triangle Park, NC: U.S. EPA EPA-HQ-OAR-2010-0841-0001, March 2011). http://www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf

[15] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, (Washington, DC, March 2011). http://www.epa.gov/nsr/ghgdocs/bioenergyguidance.pdf

4.13. SUMMARY OF PROPOSED BACT EMISSIONS LIMITS

Table 4-3: Proposed BACT Table

Source	Pollutant	Control/Operation	Proposed Emission Limit	Emission Limit Units
Dryer System	NO_x	Good combustion practices; burner design	0.200	lb/MMBtu
	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Cyclones + WESP	0.086	lb/ODT
	VOC	Process Design	1.07	lb/ODT (annual)
Green Wood Hammermills	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Bin Vent Filter	0.004/ 0.004/ .000014	gr/cf
	VOC	Good operating & maintenance procedures	0.27	lb/ODT
Hammermill Area	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Fabric Filter	0.004/ 0.004/ .000014	gr/cf
Dry Hammermills	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Cyclones + Fabric Filter	0.004/ 0.004/ .000014	gr/cf
	VOC	Process Design	0.24	lb/ODT (annual)
Pellet Mill Feed Silo	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
Pellet Mill Fines Bin	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
Final Product Handling	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Fabric Filter	0.004/ 0.004/ .000014	gr/cf
Pellet Coolers	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Cyclones	0.022/ 0.0057/ 0.0007	gr/cf
	VOC	Process Design	0.85	lb/ODT (annual)
Log Bark Hog	VOC	Fugitive - N/A	N/A	N/A
Chipper	VOC	Fugitive - N/A	N/A	N/A
Storage Tanks	VOC	Fugitive - N/A	N/A	N/A
Green Wood Handling	$TSP/PM_{10}/PM_{2.5}$	Inherent Moisture	N/A	N/A
Storage Piles	$TSP/PM_{10}/PM_{2.5}$	Inherent Moisture	N/A	N/A
	VOC	Fugitive - N/A	N/A	N/A
Roads	$TSP/PM_{10}/PM_{2.5}$	Paving & Water Spray	N/A	N/A
Emergency Generator	All Pollutants	NSPS Certification	N/A	N/A
Firewater Pump	All Pollutants	NSPS Certification	N/A	N/A
Backup Chipper	All Pollutants	NSPS Certification	N/A	N/A

TABLE 4-2
SUMMARY OF PROPOSED BACT LIMITS
ENVIVA PELLET SAMPSON, LLC

Source	Pollutant	Control/Operation	Proposed Emission Limit	Emission Limit Units
Dryer System	NO_x	Good combustion practices; burner design	0.200	lb/MMBtu
	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Cyclones + WESP	0.086	lb/ODT
	VOC	Process Design	1.07	lb/ODT (annual)
Green Wood Hammermills	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Bin Vent Filter	0.004/ 0.004/ .000014	gr/cf
	VOC	Good operating & maintenance procedures	0.27	lb/ODT
Hammermill Area	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Fabric Filter	0.004/ 0.004/ .000014	gr/cf
Dry Hammermills	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Cyclones + Fabric Filter	0.004/ 0.004/ .000014	gr/cf
	VOC	Process Design	0.24	lb/ODT (annual)
Pellet Mill Feed Silo	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
Pellet Mill Fines Bin	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
Final Product Handling	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Fabric Filter	0.004/ 0.004/ .000014	gr/cf
Pellet Coolers	$TSP/PM_{10}/PM_{2.5}$ (filterable)	Cyclones	0.022/ 0.0057/ 0.0007	gr/cf
	VOC	Process Design	0.85	lb/ODT (annual)
Log Bark Hog	VOC	Fugitive - N/A	N/A	N/A
Chipper	VOC	Fugitive - N/A	N/A	N/A
Storage Tanks	VOC	Fugitive - N/A	N/A	N/A
Green Wood Handling	$TSP/PM_{10}/PM_{2.5}$	Inherent Moisture	N/A	N/A
Storage Piles	$TSP/PM_{10}/PM_{2.5}$	Inherent Moisture	N/A	N/A
	VOC	Fugitive - N/A	N/A	N/A
Roads	$TSP/PM_{10}/PM_{2.5}$	Paving & Water Spray	N/A	N/A
Emergency Generator	All Pollutants	NSPS Certification	N/A	N/A
Firewater Pump	All Pollutants	NSPS Certification	N/A	N/A
Backup Chipper	All Pollutants	NSPS Certification	N/A	N/A

TABLE B-1
PSD APPLICABILITY SUMMARY
ENVIVA PELLET SAMPSON, LLC

Source Description	Unit ID	CO (tpy)	NOx (tpy)	TSP (tpy)	PM-10 (tpy)	PM-2.5 (tpy)	SO2 (tpy)	VOC (tpy)	Pb (tpy)	CO_{2e} (tpy)	CO_{2e} biomass deferral[1] (tpy)
Dryer System	ES-DRYER	80.07	179.58	42.20	42.20	42.20	22.45	288.25	0.00E+00	189,586	3,908
Emergency Generator	ES-EG	0.36	0.41	0.02	0.02	0.02	0.0002	0.41	-	67	67
Fire Water Pump	ES-FWP	0.36	0.41	0.02	0.02	0.02	0.0002	0.41	-	67	67
Hammermills/ Hammermill Area	ES-HM-1 thru 8/ ES-HMA	-	-	20.27	20.27	0.07	-	34.37	-	-	-
Pellet Mill Feed Silo	ES-PMFS	-	-	0.37	0.37	0.37	-	-	-	-	-
Pellet Mill Fines Bin	ES-PFB	-	-	0.54	0.54	0.54	-	-	-	-	-
Pellet Presses and Coolers	ES-CLR1 thru -6	-	-	59.47	15.49	1.90	-	227.64	-	-	-
Log Bark Hog	ES-BARKHOG			-	-	-		0.37			
Log Chipping	ES-CHIP-1	-	-				-	1.25	-	-	-
Green Wood Hammermills	ES-GHM-1, ES-GHM-2	-	-	3.00	3.00	3.00	-	50.53	-	-	-
Finished Product Handling/ Pellet Loadout Bins/ Pellet Loadout Area	ES-FPH/ ES-PL/ ES-PB-1 & 2	-	-	5.33	4.85	0.02	-	-	-	-	-
Paved Roads		-	-	2.42	0.48	0.12	-	-	-	-	-
Dried Wood Handling	IES-DWH			0.30	0.30	0.30					
Green Wood Sizing & Handling	IES-GWH	-	-	0.016	0.008	0.001	-	-	-	-	-
Green Wood Storage Piles	IES-GWSP1 & 2	-	-	4.01	2.00	0.30	-	2.93	-	-	-
Diesel Storage Tanks	TK1, TK2, & TK3	-	-	-	-	-	-	4.00E-03	-	-	-
Project Emissions		**80.78**	**180.40**	**137.97**	**89.56**	**48.86**	**22.45**	**606**	**0.00E+00**	**189,719**	**4,041**
PSD Significant Emission Rate		**100**	**40**	**25**	**15**	**10**	**40**	**40**	**0.60**	**75,000**	**75,000**
PSD Review Required		**No**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**

1. CO_{2e} does not include CO_2 from biomass combustion.

TABLE B-4
ROTARY DRYER -CRITERIA POLLUTANT EMISSIONS
ENVIVA PELLET SAMPSON, LLC

Dryer Inputs

Dryer Throughput (@ Dryer Exit)	575,000	tons/year @ 6.5% moisture
Annual Dried Wood Throughput of Dryer	537,625	ODT/year
Hourly Dried Wood Throughput of Dryer	71.71	ODT/hr
Flow rate =	215,000	ACFM
Exit Temperature =	355.40	deg K
Standard flow rate =	177,342	SCFM
Annual Utilization Factor	100%	
Burner Heat Input	205.0	MMBtu/hr
Annual Burner Heat Input at Annual Utilization	1,795,800.0	MMBtu/yr
Percent Hardwood	25%	
Percent Softwood	75%	
RTO CO Control Efficiency	0%	
RTO VOC Control Efficiency	0%	

Criteria Pollutant Calculations:

Pollutant	Baseline Emission Factors			Proposed BACT Emission Factor			Baseline Emissions		Total Controlled Potential Emissions	
	Uncontrolled Biomass Emission Factor	Units	Emission Factor Source	Controlled Biomass Emission Factor	Units	Emission Factor Source	(lb/hr)	(tpy)	(lb/hr)	(tpy)
CO	0.089	lb/MMBtu	Note 1	0.089	lb/MMBtu	Baseline	18.28	80.1	18.28	80.1
NO_X	0.200	lb/MMBtu	Note 6	0.200	lb/MMBtu	Note 6	41.00	179.6	41.00	179.6
$PM/PM_{10}/PM_{2.5}$ Condensible Fraction	0.017	lb/MMBtu	AP-42 Section 1.6	0.017	lb/MMBtu	AP-42 Section 1.6	3.49	15.3	3.49	15.3
TSP (Filterable)	2.092	lb/ODT	Note 6	0.030	lb/MMBtu	NSPS emission limit	150.00	562.3	6.15	26.9
Total TSP (Filterable + Condensible)							153.49	577.6	9.64	42.2
PM_{10} (Filterable)	2.092	lb/ODT	Note 6	0.030	lb/MMBtu	NSPS emission limit	150.00	562.3	6.15	26.9
Total PM_{10} (Filterable + Condensible)							153.49	577.6	9.64	42.2
$PM_{2.5}$ (Filterable)	2.092	lb/ODT	Note 6	0.030	lb/MMBtu	NSPS emission limit	150.00	562.3	6.15	26.9
Total $PM_{2.5}$ (Filterable + Condensible)							153.49	577.6	9.64	42.2
SO_2	0.025	lb/MMBtu	AP-42, Section 1.6 [3]	0.025	lb/MMBtu	AP-42, Section 1.6 [3]	5.13	22.4	5.13	22.4
VOC	1.07	lb/ODT	Note 2	1.07	lb/ODT	Baseline	76.90	288.3	76.90	288
Lead	0.00	N/A	N/A	0.00	N/A	N/A	0.00	0.0	0.00	0.0

Note:

[1] CO emissions are based on stack testing conducted at Ahsokie, NC facility on June 7, 2012 with 100% safety margin on CO due to the significant variability that is possible with this pollutant.

[2] VOC emissions emission factor based on Vendor guarantee of 0.95 lb/ODT as propane converted to alpha -pinene and Enviva Wiggins October 2013 Stack Test Data as Total VOC as alpha-pinene using OTM 26.

[3] Although the vendor estimated emissions to include condensibles, additional condensibles from wood combustion AP-42, Section 1.6 were included. The vendor only provided the filterable fraction of particulate matter in the emission factors. Enviva has conservatively calculated the condensible fraction based upon the heat input of the dryer burners using an emission factor for wood combustion from AP-42, Section 1.6.

[4] No emission factor is provided in AP-42, Section 10.6.2 for SO_2 for rotary dryers. Enviva has conservatively calculated SO2 emissions based upon the heat input of the dryer burners using an emission factor for wood combustion from AP-42, Section 1.6.

[5] Controlled filterable particulate matter emissions based on NSPS Subpart Db limit of 0.03 lb/MMBtu.

[6] NO_x and filterable PM/PM10 emissions based on TSI guanrantee on 7/15/14. The $PM_{2.5}$ filterable emission factor is assumed to be the same as PM and PM10.

TABLE D-4
NOx BACT IMPACTS SUMMARY
ENVIVA PELLET SAMPSON, LLC

				Economic Impacts			Energy Impacts	Environmental Impacts
Control Options (lb/MMBTU)	Baseline Emissions (tons/yr)	Control Efficiency	Emissions Reduction (tons/year)	Total Capital Cost ($)	Annual Cost ($/year)	Cost Effectiveness ($/ton)	Increase Over Baseline (kW*hr/yr)	Adverse Environmental Impacts? (Yes/No)
0.068 (RSCR)	179.58	66.1%	118.7	$7,136,329	$2,103,796	$17,723	4.98E+06	No
0.068 (HD SCR)	179.58	66.1%	118.7	$13,394,553	$2,820,270	$23,759	2.05E+07	No
0.150 (SNCR)	179.58	25.0%	44.9	$231,167	$157,574	$3,510	1.57E+04	No
0.200 (Baseline)	179.58	N/A	N/A	N/A	N/A	N/A	N/A	No

TABLE D-8
VOC BACT IMPACTS SUMMARY FOR ROTARY DRYER
ENVIVA PELLET SAMPSON, LLC

Control Options (lb/ODT)	Uncontrolled Emissions (tons/yr)	Control Efficiency	Emissions Reduction (tons/year)	Economic Impacts			Energy Impacts	Environmental Impacts
				Total Capital Cost ($)	Annual Cost ($/year)	Cost Effectiveness ($/ton)	Increase Over Baseline (kW*hr/yr)	Adverse Environmental Impacts? (Yes/No)
0.107 (RTO)	288.3	90%	259.4	$4,477,410	$1,879,460	$7,245	5.21E+06	No
1.07 (Baseline)	288.3	N/A	N/A	N/A	N/A	N/A	N/A	No

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July 16, 2014

William D. Willets, P.E.
Chief, Permitting Section
North Carolina DENR, Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

Via e-mail to william.willets@ncdenr.gov and First Class Mail

RE: Enviva Pellets Sampson, LLC – Air Permit Application Review

Dear Mr. Willets:

The purpose of this letter is to provide DAQ with updated information regarding the dryer to be constructed at Enviva's Sampson County facility, and to provide additional information on the critical differences between existing pellet dryers with VOC emission controls, and the dryer proposed to be constructed without controls at the Sampson facility. Attached to this e-mail are three documents: (1) Kilpatrick Townsend's memorandum to DAQ dated October 10, 2013 (submitted previously), (2) a letter from TSI (a dryer manufacturer) dated December 6, 2013 (submitted previously), and (3) an updated letter from TSI dated July 16, 2014 (new submission).

Enviva has selected TSI as the vendor to construct the dryer at Enviva's Sampson facility. Enviva believes that the attached June 2014 letter from TSI further supports Enviva's contention that the dryer planned for construction at the Enviva Sampson facility represents an inherently lowering emitting pellet dryer that is substantially different from any pellet dryer currently in operation and equipped with RTO control. Importantly, TSI is the manufacturer of the dryers at Green Circle, Georgia Biomass, and German Pellets (equipped with RTOs). In its 112(g) MACT analysis, DAQ had previously raised concerns about the German Pellets dryer (of the three, the closest comparison to Sampson) being similar to the dryer proposed by Enviva. TSI's June 2014 letter points out further and quite significant distinctions between the dryer proposed by Enviva and existing dryers with RTO controls.

The following is a full statement of Enviva's argument that the proposed Sampson dryer should not be required to be controlled under a 112(g) MACT condition.

1. Laboratory and performance testing by Dr. John Richards, Ph.D. of Air Control Techniques has confirmed that smoldering and combustion of raw materials in the drying process result in dramatically higher VOC and HAP emissions. Enviva Sampson will be designed to combine carefully managed dryer

temperature, retention time, gas mixing space, and moisture content of the wood to minimize smoldering and combustion in the dryer. The TSI dryer for Sampson will use a combination of (1) engineered mixing of dryer flue gas with furnace hot gases beyond previous TSI dryers, (2) an improved dryer drum flighting system to further segregate particles by size for appropriately paced drying while preventing hot gas streaking, (3) reduced air leakage into the system, and (4) high humidity in the dryer. These elements of the proposed dryer result in lower VOC and HAP emissions.

2. TSI has determined that the key to minimizing VOC and HAP emissions from a wood pellet dryer is to minimize the temperature of wood within the dryer drum. While competitors are attempting to limit overall air temperature, the TSI dryer uses a high humidity environment (wet bulb temperature of about 170 degrees F, and actually "sweating" moisture from the wood) to achieve the same goal more effectively. Enviva's operations are also distinguished from competitors by drying to a higher moisture content in the final wood product exiting the dryer. Enviva Sampson will typically dry raw material down to approximately 17%, compared to Enviva's competitors such as German Pellets that dry wood down to <10%. The net result of precision wood temperature and moisture management in the dryer, coupled with not drying the wood as completely as competitors (maintenance of a higher moisture content in wood exiting the dryer), is lower emissions of HAP and VOCs; i.e. an inherently lower-emitting dryer.

3. Critical engineering differences between the dryer proposed for Enviva's Sampson facility and existing dryers controlled by RTOs are discussed in detail in the June 2014 TSI letter. These include a newly designed recycle bustle, the use of two turbulators (rather than the typical one), considerably longer hot gas ductwork (3x that of German Pellets) to allow for more homogeneous gas mixing and resulting temperature control, and a redesigned flighting system. Please see the June 2014 TSI letter for more details.

4. The net result of the innovative TSI design is an inherently lower emitting dryer with projected uncontrolled VOC emissions of approximately 0.95 lbs/oven dried ton when using a 75% softwood / 25% hardwood mix.

Please contact me if I can provide any additional information to assist in your review of the Enviva Pellets Sampson permit application.

Sincerely,

Norb Hintz, P.E.
Senior Vice President, Chief Engineer

Attachments
cc: Kevin Godwin, NC DAQ
Dale Overcash, Trinity Consultants
Alan McConnell, Esq.

Responsible Innovation

Enviva
North Carolina

July 16th, 2014

RE: VOC and HAP emissions

The purpose of this document is to discuss the VOC and HAP emissions from Single Pass Recycle Rotary Dryer Drums. This document is to be used only by Enviva and North Carolina State Emissions Agency; this document is not to be shared with any other parties.

TSI is a major supplier of Dryer Systems to the Oriented Strand Board Plants, Particle Board Plants, and Pellet Plants. To date TSI has supplied Dryer Systems to four of the World's largest Pellet Plants, those being Green Circle in Florida (600,000 mtpy), Georgia Biomass in Georgia (750,000 mtpy), German Pellets in Texas (600,000 mtpy), and German Pellets in Louisiana which is currently under construction (1,200,000 mtpy). TSI has also supplied Dryer Systems to a number of smaller Pellet Plants like Solvay in Mississippi (200,000 mtpy), Lee Energy in Alabama (150,000 tpy), Allegheny Wood Products in West Virginia (75,000 tpy), Geneva Wood in Maine (125,000 tpy), etc... TSI only supplies Single Pass Recycle Rotary Dryer Drums.

Throughout the three major projects (the Green Circle, Georgia Biomass, and German Pellets) TSI has steadily improved the performance of VOC emissions from the Dryer Systems. This document will focus at these three plants because they are about the same size as Enviva's future plants (about 500,000 metric tons/year) and because all three of these pellet plants process 100% Southern Yellow Pine, which is the major contributor to VOC and HAP emissions when compared to Hardwoods.

Emissions					
	VOC Emissions (Lbs/ODT)	Recycle Bustle	No. of Turbulators	Linear Feet From Recycle Bustle to wood chips	Dryer Drum Design to move dust from inlet
Green Circle	3.41	Yes	None	7'	No
Georgia Biomass	2.64	Yes	One (1)	10'	Yes
German Pellets	1.12	Yes	One (1)	28'	Yes
Enviva	0.8 (projected)	Yes	Two (2)	90'	Yes (further improvements)

As shown above TSI has steadily reduced VOC emissions from Green Circle (project completed in 2008), to Georgia Biomass (project completed in 2010), to German Pellets (project completed in 2013). As noted above, all of these plants process 100% Southern Yellow Pine, and dry wood chips between 7% and 10% moisture content wet-weight-basis.

Enviva's plants will also dry wood between 20% and 15% moisture content wet-weight-basis; this will further reduce VOC emissions since this type of drying is less 'aggressive'.

IMPROVEMENTS:

The key to minimizing VOC & HAP emissions is essentially to minimize the temperature of the wood within the Drum. The wood always contains water, as it is not dried bone dry, and as such if it is exposed to 'moist' gas stream the wood should not exceed the Dryer System gas stream 'wet-bulb' temperature. The 'wet-bulb' temperature within a TSI Dryer System is typically about 170°F; thus the wood should never exceed 170°F. The 'moist' gas stream means that gasses impacting the wood are high in moisture, which protects wood from overheating and essentially 'sweats' water from the wood. To provide 'moist' gas stream to the Dryer System the mixing of 'dry' Furnace hot gas and 'moist' Dryer System recycle gas must be done very carefully. The 'dry' Furnace gas will enter the Dryer System Recycle Bustle at about 1500°F where it will connect the 'moist' (50% humidity) Dryer System flue gas at about 250°F. Conventional wisdom states that gasses at different temperatures will mix to a final homogeneous temperature. However, from the time the two gasses enter the Recycle Bustle till the gasses are at the Dryer Drum inlet is typically only about 0.25 second, and thus not enough time for the two gasses to mix completely. Result is streaks of gasses entering the Drum at 1500°F and 250°F and some gasses that have mixed at a temperature of about 700°F. Thus, most of the emissions are generated where 1500°F gasses impact the wood within the Drum.

To mix the two gasses TSI has improved the design of the Recycle Bustle, along with implementation of the Turbulator, which is essentially a mixer that forces turbulence and thus mixing of the two gas streams. TSI has also increased the length of hot gas ductwork between the Recycle Bustle and the Dryer Drum to allow longer time for the two gas streams to mix. Improved Recycle Bustle, along with Turbulators and longer mixing residence time, will ensure complete homogeneous humid gas mixture impacting wood within the Drum, thus minimizing VOC emissions.

For the Enviva plant, TSI will employ identical Recycle Bustle from German Pellets pellet plant, along with two (2) Turbulators (instead of one) to further create turbulence and promote gas mixing, and finally three times the mixing residence time (from 28' to 90' of linear duct) to ensure thorough mixing.

The second component to minimizing VOC & HAP emissions is the Drum's flighting system. Most of the emissions come from the small fines that enter the Dryer Drum; these don't require much energy to dry and thus can easily get bone dry and overheat, thus generating more emissions. The TSI flighting system has also been continually improved over the three aforementioned projects and TSI has identified another improvement that it can make within the Drum's flighting system to essentially move the fines away from the Drum's inlet as quickly as possible in order to minimize its exposure to high heat in that area. This additional improvement at the Enviva's plant will further drive VOC emissions lower.

Projected VOC & HAP emissions from a TSI Dryer System for the Enviva plant processing 70 BDTPH with 60% pine and 40% hardwoods:

1) VOC: 0.80 lbs/ODT
2) HAPs: 0.08 lbs/ODT

Projected VOC & HAP emissions from a TSI Dryer System for the Enviva plant processing 70 BDTPH with 75% pine and 25% hardwoods:

3) VOC: 0.95 lbs/ODT
4) HAPs: 0.1275 lbs/ODT

Best Regards,

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tsi
Responsible Innovation

Enviva
North Carolina

December 6th, 2013

RE: VOC emissions

The purpose of this document is to discuss the VOC emissions from Single Pass Recycle Rotary Dryer Drums. This document and its attachments are to be used only by Enviva and North Carolina State Emissions Agency; this document is not to be shared with any other parties.

TSI is a major supplier of Dryer Systems to the Oriented Strand Board Plants, Particle Board Plants, and Pellet Plants. To date TSI has supplied Dryer Systems to three of the World's largest Pellet Plants, those being the Green Circle in Florida (600,000 mtpy), the Georgia Biomass in Georgia (750,000 mtpy), and German Pellets in Texas (600,000 mtpy). TSI has also supplied Dryer Systems to a number of smaller Pellet Plants like Lee Energy in Alabama (150,000 tpy), Allegheny Wood Products in West Virginia (75,000 tpy), Georgia Biomass in Maine (125,000 tpy), etc... TSI only supplied Single Pass Recycle Rotary Dryer Drums.

The above plants operate between softwoods & hardwoods. The three large Pellet Plants process 100% softwoods, while Lee Energy processes 70% hardwoods with 30% softwoods, and Allegheny Wood Products processes 100% hardwoods.

Typically the primary source of VOC (Volatile Organic Compounds) emissions is from softwoods. Hardwoods don't emit much VOC emissions. VOC emissions are also tied to the temperature that the wood is exposed to at the front of the Drum.

At Green Circle, where two (2) TSI Drums dry softwoods from 50% mc to 10% mc, the Ø18 foot by 80' long Dryer Drums typically operate at inlet temperatures of around 1100°F. Each Dryer Drum produces 44.53 ODT/hr. VOC emissions are 152 lbs/hr. This equals to 3.41 lbs/ODT of VOC emissions. The Green Circle plant has both WESP & RTO.

At Georgia Biomass, where (2) TSI Drums dry softwoods from 50% mc to 10% mc, the Ø20 foot by 100' long Dryer Drums typically operate at inlet temperatures of around 900°F. Each Dryer Drum produces 55.66 ODT/hr. VOC emissions are 147 lbs/hr. This equals to 2.64 lbs/ODT of VOC emissions. The Georgia Biomass plant has both WESP & RTO.

At German Pellets, where (2) TSI Drums dry softwoods from 50% mc to 10% mc, the Ø20 foot by 80' long Dryer Drums typically operate at inlet temperatures of around 650°F. Each Dryer Drum produces 38.5 ODT/hr. TSI is currently scheduled to perform testing 2nd week of January. TSI expects the VOC emissions to be less than 1 lbs/ODT. The German Pellets plant has both WESP & RTO.

At Lee Energy , where a single (1) TSI Drum dries 70% hardwoods along with 30% softwoods from 50% mc to 10% mc, the Ø14 foot by 70' long Dryer Drum typically operates at inlet temperatures of around 650°F. The Dryer Drum produces 17 ODT/hr. VOC emissions are 8.34 lbs/hr. This equals to 0.49 lbs/ODT. The Lee Energy plant does not have WESP or RTO; all emissions are under 100 tons/year.

At a Weyerhaeuser OSB plant in Deerwood, MN, where two (2) TSI Drums dry 70% hardwoods along with 30% softwoods from 50% mc to 4% mc, the Ø14 foot by 40' long Dryer Drums typically operate at inlet temperatures of around 900°F. Each Dryer Drum produces 9 ODT/hr; both Drums go to a single stack to an EFB (electrified filter bed) but there is no RTO; both Dryer Drums produce 9.1 lbs/hr of VOC. This equals 0.51 lbs/ODT.

At Allegheny Wood Products, where a single (1) TSI Drum dries 100% hardwoods from 50% mc to 10% mc, the Ø9 foot by 40' long Dryer Drum typically operates at inlet temperatures of around 950°F. The Dryer Drum produces 10 ODT/hr. VOC emissions are 2.34 lbs/hr. This equals to 0.23 lbs/ODT. This plant has no Pollution Control Equipment (WESP or RTO).

At the Huber OSB plant in Easton, ME, where two (2) TSI Drums dry 90% hardwoods from 50% mc to 10% mc, the Ø15' by 70' long Dryer Drums typically operate at inlet temperatures of around 950°F. The Dryer Drums produce 30 ODT/hr. VOC emissions are less than 10 lbs/hr. This equals to 0.33 lbs/ODT. This plant only has a Dry ESP to control particulate emissions; there is no RTO.

The Enviva Pellet Plants will produce 495,000 ODT/year, or 58.9 ODT/hr. The plant will process 75% softwoods (maximum) & 25% hardwoods (minimum). From above, a TSI Dryer Drum processing 75% softwoods & 25% hardwoods would generate about 0.75 lbs/ODT (this takes into account that the Dryer Drum would operate under 650°F). Thus, the Dryer Drum would produce 44.2 lbs/hr or 194 tons/year (8760 hours/year). This system would only require a WESP to reduce PM emissions. This also assumes that product going into the Dryer Drum is reduced to ¼" minus (95% is less than ¼" minus screen).

If you have any questions please either call my cell phone or e-mail.

Best Regards,

Zlatko Savovic
TSI,Inc.
(425) 239-7490
zsavovic@tsi-inc.net
www.tsi-inc.net

Enviva – Sampson

Wood pellet dryer MACT Subcategorization request:

> The administrator has the discretion to distinguish among classes, types and sizes of sources within a category or subcategory in establishing standards. The EPA maintains that, normally, any basis for subcategorization must be related to an effect on HAP emissions that is due to the difference in class, type, or size of the units.

Enviva's dryers differ from those of its competitors:

Physical Design of Dryer

- Furnace critically designed retention time, ample volume and staged combustion
- Specially designed turbulence in mixing combustion gases
- Baffles within drum for more "gentle" drying using radiant heat transfer

Operational Design

- Not overly drying chips
- Lower inlet and outlet temps.
- Distribution and redistribution of product within the dryer drum at inlet and approximately 10 feet down length of drum

VENDOR FROM GA.

KILPATRICK TOWNSEND

ATTORNEYS AT LAW

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OCT 1 6 2013

Air Permits Section

October 10, 2013

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To: North Carolina Division of Air Quality

From: Alan McConnell
Gary R. Sheehan Jr.

Received

OCT 1

Air Permits Section

Re: Follow-Up Information Regarding MACT Subcategorization for Enviva Pellets Permit Application

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As Enviva discussed at a meeting with DAQ on September 11, 2013, there is considerable support within the Clean Air Act ("CAA") and EPA's prior MACT determinations, most notably the recent Industrial Boiler MACT rulemaking, for the recognition and creation of subcategories of sources within the context of a MACT determination. Indeed, in that rulemaking, EPA created nineteen subcategories for boilers, including seven subcategories for biomass combustion boilers alone, due to the sources' varying designs and associated emissions.

The unique process and technologies involved with Enviva's wood drying system justify a determination that the Sampson County facility is a new/unique subcategory for purposes of its MACT application. Enviva's dryers differ from those of its competitors in a number of ways.

These differences include the following:

1. Lower inlet and outlet temperatures.
2. Critically designed dryer retention time with ample furnace volume and staged combustion to minimize carryover of embers out of the furnace.
3. Specially designed turbulence in the mixing of the combustion gases which greatly enhances the destruction of fuel VOC's and CO.
4. More metal internals (baffles) within the drum. This larger metal surface area allows for more gentle drying using more radiant heat transfer.
5. Critically designed distribution and redistribution of product within the dryer drum, at the inlet and approximately every ten feet down the length of the drum, keeps the product uniformly exposed to heat during the drying process. This uniform exposure allows the product to dry with very little variation and with less over-dried product.

6. Redistribution of the material every ten feet also allows for the smaller material to move through the dryer at a faster rate that keeps this material from being over dried.

For these reasons, Enviva's dryer design represents a process design and methodology that substantially reduces VOC and HAP emissions without the need for an RTO. Enviva's dryers cannot be considered a "similar source" to the three existing facilities discussed in Section 3.1.5.2 of the recent permit application.

Section 112 of the Clean Air Act provides EPA broad discretion to establish subcategories of sources. See: CAA §112(c)(1) (authority to "establish subcategories under this section, as appropriate") and 112(c)(5) ("Administrator may, at any time list additional categories and subcategories"). In addition, the D.C. Circuit has previously held that Congress' use of the phrase "as appropriate" within a statute confers a substantial amount of discretion on the implementing agency. Consumer Fed. Of America v. U.S. Dep't of Health and Human Services, 83 F.3d 1497 (D.C. Cir. 1996). Section 112 of the Act further clarifies that EPA "may distinguish among classes, types and sizes of sources within a category or subcategory." CAA § 112(d)(1). Congress' use of the broad terms "classes, types, and sizes" demonstrates that EPA is intended to have considerable discretion when determining the breadth of a category or subcategory.

EPA has frequently recognized its discretionary authority to create subcategories during MACT rulemakings. See e.g., *EPA's Responses to Comments on EPA's NESHAP for HAPs for Major Source Industrial, Commercial and Institutional Boilers and Process Heaters*, Vol. 2, February 2011, Comment Excerpts 145 – 148, 49 – 51, etc. ("EPA thanks the commenters for their support and recognition of EPA's authority to create subcategories based on legislative history, case law and the CAA") (see attachments). In EPA's more recent Response to Comments on the Boiler NESHAP/MACT, published in December 2012, EPA also stated that "section 112 provides EPA with broad discretion to subcategorize among sources in a source category." *December 2012 Response to Comments on Boiler MACT*, p 481. In that document, EPA also noted that:

"Emissions [of CO, PM, and metallic HAP] vary greatly with the design of the combustion unit; the same lot of fuel could exhibit a vastly different emission profile between different combustor designs." *Id.* at 480.

"Under CAA section 112(d)(1), the Administrator has the discretion to distinguish among classes, types and sizes of sources within a category or subcategory in establishing standards. The EPA maintains that, normally, any basis for subcategorization (*i.e.*, class, type, or size) must be related to an effect on HAP emissions that is due to the difference in class, type, or size of the units." *Id.* at 489, 493.

When developing the various subcategories within the Boiler MACT, EPA explained that it agreed to create a subcategory for boilers designed to burn kiln-dried wood due to the fact that the boilers "are designed and sized to efficiently combust biomass that has already undergone a drying process." 76 Fed. Reg. 80,598, at 80,608 (Dec. 23, 2011). EPA noted that such facilities carefully "maintain the fuel moisture content at levels far lower than virgin biomass materials." Id. EPA also created a subcategory for hybrid suspension/grate boilers designed to combust bagasse due to the fact that they are uniquely designed to combust very wet biomass and that the particle size profile from the units "differs significantly" from other units. Id.

In the earlier, March 2011, version of EPA's final rule on the Boiler MACT, EPA justified the need for multiple subcategories for biomass boilers because it recognized that even "within the basic unit types there are different designs and combustion systems that . . . have a much larger effect on pollutants whose emissions depend on the combustion conditions in a boiler or process heater." 76 Fed. Reg. 15608, at 15,617. EPA went on to explain that biomass boilers that are designed to combust moist bagasse, have unique "design differences" which create "combustion conditions ... [that] are not similar" to other units that are designed to "fine, dry fuels." Id., at 15,634 (also acknowledging the commenter's explanation that the boilers are designed to have "high heat release rates and high excess air rates" to dry the biomass with different "fuel density and moisture" than other units).

Just as EPA has recognized that the unique "combustion conditions" within a boiler and the moisture content of the boilers' intended fuel can affect emissions, the unique heating conditions (i.e., lower temperatures drying larger wood chips with less surface area) within the planned Enviva dryers and the planned methodology of not overly-drying the chips will have a direct and distinct impact on emissions from the units. Based on this, Enviva's dryers are entitled to the determination that they are a new subcategory for purposes of the facility's MACT determination.

Please see the attached excerpts and highlights of recent EPA Boiler MACT rulemaking materials for additional information regarding EPA's rationale for subcategorizations. Please also do not hesitate to contact Alan McConnell or Dale Overcash of Trinity Consultants if you have any questions or need any additional information on this matter.

Attachments

Feb. 2011

EPA's Responses to Public Comments on EPA's *National Emission Standards for Hazardous Air Pollutants for Major Source Industrial Commercial Institutional Boilers and Process Heaters*

Volume 2 of 2

Comments letters and transcripts of the public hearings are also available electronically through http://www.regulations.gov by searching Docket ID *EPA-HQ-OAR-2002-0058*.

FOREWORD

This document provides EPA's responses to public comments on EPA's Proposed *National Emission Standards for Hazardous Air Pollutants for Major Source Industrial Commercial Institutional Boilers and Process Heaters*. EPA published a Notice of Proposed Rulemaking in the Federal Register on June 4, 2010 at 75 FR 32005. EPA received comments on this proposed rule via mail, e-mail, facsimile, and at three public hearings held in Washington, DC, Houston, Texas, and Los Angeles, California in June 2010. Copies of all comments submitted and transcripts for the public hearings are available at the EPA Docket Center Public Reading Room. Comments letters and transcripts of the public hearings are also available electronically through http://www.regulations.gov by searching Docket ID *EPA-HQ-OAR-2002-0058.*

Due to the size and scope of this rulemaking, EPA paraphrased a limited amount of major comment themes in the preamble of the final rule. This document contains the verbatim comments provided by each commenter extracted from the original letter or public hearing transcript.

For each comment, the name and affiliation of the commenter, the document control number (DCN) assigned to the comment letter, and the number of the comment excerpt is provided. *Table 1* of this document provides a complete listing of the DCN and affiliations included in this document. In some cases the same comment excerpt was submitted by two or more commenters either by submittal of a form letter prepared by an organization or by the commenter incorporating by reference the comments in another comment letter. Rather than repeat these comment excerpts for each commenter, EPA has listed the comment excerpt only once and provided a list of all the commenters who submitted the same form letter or otherwise incorporated the comments by reference in *Tables 2 and 3* at the end of this document.

Several of EPA's responses to comments are provided immediately following each comment excerpt. However, in instances where several commenters raised similar or related issues, EPA has grouped these comments together and provided a single response after the first comment excerpt in the group and referenced this response in the other comment excerpts. In some cases, EPA provided responses to specific comments or groups of similar comments in the Preamble to the final rulemaking. Rather than repeating those responses in this document, EPA has referenced the Preamble or the appropriate technical support document for a description of the analysis included in the final rule. In other cases EPA has provided a general response at the beginning of each section of this document.

Parallel with this rulemaking effort are three separate, but related rulemakings that may be of interest to stakeholders. These three rules are: *National Emission Standards for Hazardous Air Pollutants for Area Source Industrial/Commercial/Institutional Boilers* (Docket ID: EPA-HQ-OAR-2006-0790); *Identification of Non-Hazardous Secondary Materials That Are Solid Waste* (Docket ID: EPA-HQ-RCRA-2008-0329); and *Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units* (Docket ID: EPA–HQ–OAR–2003–0119).
Given the identical proposal dates, and the related nature of these other rules, many commenters submitted comments to this rulemaking docket that were specific to one of these related rulemakings. Some commenters submitted a single DCN with comments on all four rules while others submitted a separate DCN specific to each rule. Many commenters submitted identical

comments to all of these dockets. In order to reduce duplicative comments, this document flags comments associated with any of the above three related rulemakings as out-of-scope comments for this response to comment document. To the extent that the commenter submitted these comments to the appropriate rulemaking document, responses have been developed in the response to comment documents for each of these related rulemakings. For this reason, EPA encourages the public to read the other response to comment documents prepared for these three other rulemakings as they may contain topics relevant to these other rulemakings.

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Comment: We operate a 10 million BTU per hour biomass boiler for approximately 130 days out of the year with only 40% of those operating days at 10 million BTUs per hour yet under the current Boiler MACT regulations we would be under the same restrictions as much larger boilers operating 365 days a year at full load. In today's economy with high unemployment, house foreclosures and a shrinking manufacturing job market, mills like ours are more important than ever and Boiler MACT in its current form puts us at great risk.

Boiler MACT under its current structure accomplishes too little for the investment required. I do not disagree that we should strive for continuous improvement but it must be done within a framework of affordability with common sense attainable goals. Under the current rules a boiler which operates 130 days / year or 14 days / year is under the same emission limits as boilers operated 365 days yet the investment could very well be the same to meet the new guidelines. The economics make it nearly impossible to justify the small impact our reduction would make to the environment. There comes a point of diminishing returns that do not appear to be justifiable. I support clean air and clean water but there are limits that struggling industries can afford.

Response: Please refer to the preamble for discussion of the limited use subcategory.

Commenter Name: David A. Buff
Commenter Affiliation: Golder Associates
Document Control Number: EPA-HQ-OAR-2002-0058-1841.1
Comment Excerpt Number: 2

Comment: Bagasse is produced in a sugar mill as a result of sugar being extracted from sugarcane. Bagasse is the wet fibrous material remaining after the sugarcane has been cut, ground, and repeatedly washed and pressed to recover as much sucrose as possible. Since the very beginning of its operations in the United States, the sugar producing industry has used bagasse as the primary fuel for its boilers. Bagasse boilers are specifically designed to dry and burn the bagasse in the furnace, and the boilers are wholly integrated into the operations of the sugar mills. As bagasse is produced in the sugarcane milling/grinding process, it is fed directly into the boilers, where the bagasse is dried and burned. In a typical integrated sugar mill, the burning of the bagasse generates enough heat to produce the steam and electricity needed to power the operation of the sugar mills. [See submittal for the detailed flow diagram in the foldout drawing and in Figure 1.]

Bagasse boilers exhibit several distinctive design, operating, and emission characteristics when burning bagasse. These characteristics can be summarized as follows:
(a) Bagasse boilers are uniquely designed and operated to burn bagasse
(b) Bagasse boilers are fully integrated with the sugar mill and the other boilers at the mill
(c) Bagasse is fed directly and continuously from the sugar mills to the boilers
(d) Bagasse is a unique fuel generated by an industrial process, with high moisture content, low density, wide range of particle sizes, and other unique characteristics

When these characteristics are considered together, it is clear that bagasse boilers constitute a unique class of industrial boilers. Consequently, bagasse boilers should be regulated in a separate subcategory under the revised Boiler MACT rules. This subcategory should not include other types or classes of boilers (e.g., boilers that burn other types of biomass or fossil fuel).

Many times in the past, EPA has created various subcategories in rulemaking under the Clean Air Act (CAA) because EPA has recognized that a facility's emissions can be significantly affected by the facility's fuel, design, size, age, and use. When establishing the upcoming Boiler MACT rules, EPA has the statutory authority pursuant to Section 112 of the CAA to create subcategories based on "classes, types, or sizes" of industrial boilers. Indeed, EPA has created several industrial boiler subcategories in the proposed Industrial Boiler MACT rule published on June 4, 2010.

EPA should create a subcategory for bagasse boilers because they constitute a distinct class and type of boiler. Their design and operation sets them apart from other solid fuel and biomass-fueled boilers. Their unique characteristics significantly affect the boilers? emissions. Bagasse also has distinctive fuel characteristics that affect the boilers? emissions. Creating a subcategory for bagasse boilers, based on the class or type of boiler, or fuel type, will help ensure that the MACT emissions standards for bagasse boilers are based on the performance of "similar sources," as required by the CAA. Conversely, EPA would not be able to establish an appropriate MACT floor for bagasse-fired boilers if bagasse boilers were regulated in a MACT category that includes other types or classes of solid fuel-fired or biomass-fired boilers.

2.0 BACKGROUND INFORMATION ON SUGARCANE AND SUGARCANE PROCESSING

The following discussion summarizes some basic information about sugarcane, sugarcane processing, bagasse, and bagasse boilers. Sugarcane is a member of the grass family, and is grown in numerous countries around the world, including the United States, China, India, Cuba, Venezuela, Indonesia, Australia, and many more. The cane grows year round, but typically the harvesting and milling operations occur over just a few months. In the U.S., the sugar mills typically run 24 hours per day during the milling season. The milling operations usually are completed in 4 to 6 months in Florida and Texas, and 9 months in Hawaii.
The tops and most of the leaves of the sugarcane plants are removed in the field and then the cane is brought to the mills in large trailers by truck or railcar. The typical composition of the sugarcane is presented in Table 1. [See Submittal for Table 1]

In the sugar mill, the cane is first cut into smaller pieces.[In Hawaii, but not Florida, the cane is washed in a cane "cleaner" prior to cutting. The cleaner is used to remove some of the extraneous soil that adheres to the cane when it is brought in from the fields.] Next, the sugarcane is subjected to grinding and washing, which is repeated from 4 to 8 times in a sugar mill "tandem." This process extracts as much of the sugarcane juices (primarily sucrose) as possible from the cane. This process also removes some, but not all, of the soil that may be clinging to the cane (carried in from the fields). The sugarcane juices are then clarified and evaporated to produce raw sugar crystals. Refer to the flow diagram in the foldout diagram and Figure 1.

Bagasse is the traditional name given to the cellulosic fiber and pith that remain after the sucrose juice has been extracted from a sugarcane stalk during the milling process. The composition of the biomass is changed in this process of producing bagasse from sugarcane. The typical composition of bagasses is shown in Table 2. [See submittal for Table 2]

The heat needed to operate the evaporators in the sugar production process, and the power (steam and electrical) needed to operate the mill equipment, are obtained by burning the bagasse in boilers that are specifically designed for the simultaneous drying and combustion of bagasse. The design of a sugar mill always includes the complete integration of the bagasse-burning boilers with the rest of the mill. The bagasse generated in the mill is normally sent directly to the boilers as fuel. The boilers produce steam, which in turn is used in the milling tandems (high pressure) and in the raw sugar production process (low pressure). The steam also is used in steam turbine generators to produce electricity for the mill's internal consumption. In some locations, excess electricity is fed back into the local power grid.

3.0 DESIGN AND OPERATION OF BAGASSE BOILERS

The design and operation of bagasse boilers differ significantly from other solid fuel and biomass-fired boilers. First, because bagasse contains between 48 percent and 55 percent moisture, it must be dried before it can be burned. This is accomplished in boilers specifically designed for this task. Secondly, bagasse fuel is low density and encompasses a wide range of particle sizes. A typical sample of bagasse has particle dimensions ranging from less than 100 micrometers up to a few centimeters, which is much different than the wood fired in boilers. The boilers must have specially designed feeders to spread the bagasse across the boiler.

The bagasse typically is conveyed directly and continuously from the mill to the boiler and then is dropped into chutes and fed into the boilers by means of fuel distributors. Air distributors located immediately below the fuel distributors inject air at the point where the bagasse is introduced into the boiler in order to spread the bagasse over the boiler width and length. The drying (and much of the combustion) occurs while the material is suspended in air. Hence, they are often called "suspension" boilers. However, due to the wide range of particle size and the high moisture content of the bagasse fuel, some of the bagasse is not burned completely and falls to the grate or floor below, where the combustion is completed.
Accordingly, many bagasse boilers have grates of various types, which allow additional air to mix with the fuel and thus enhance the combustion. For this reason, many bagasse boilers can also be called "stoker" boilers. In reality, bagasse boilers utilize a combination of suspension firing and grate firing, and that affects the performance of the boilers. Bagasse boilers are almost universally designed to have high furnace heat release rates [all except one bagasse boiler has a furnace heat release rate greater than 22,800 British thermal units per hour per cubic foot of furnace volume (Btu/hr-ft3)]. These high heat release rates are needed to quickly dry the wet bagasse as it is blown into the boilers. Despite the high heat release rates, the combustion temperatures are considerably lower than in other classes of boilers, due mainly to the high moisture content of the fuel.

The high heat release rates means shorter residence times for flue gases. Consequently, even though bagasse is a very clean fuel with respect to metals, sulfur, and chlorine, the wet bagasse and the shorter residence times in the boiler result in an incomplete burn out of carbon monoxide (CO). As a result of these factors, the concentrations of CO in the furnace gases can be very high in comparison with the CO emissions from other classes of boilers. Conversely, the lower temperature in the furnace results in significantly lower nitrogen oxides (NO x) emissions compared with other classes of boilers.

The variety of sugarcane entering the mill fluctuates frequently, which causes the bagasse characteristics to fluctuate in turn. Different sugarcane varieties can cause differences in bagasse particle size, moisture content, and other fuel constituents. Different varieties are grown on different types of land, such as muck or sand lands. These differing soil types affect the amount and constituents of soil that enter the sugar mill with the sugarcane. Harvesting techniques and weather conditions (i.e., rainy or wet weather) can also affect the amount of soil brought in with the sugarcane, as well as the moisture content. Although the sugarcane undergoes a washing process to become bagasse, all of these variables lead to variability in the bagasse fuel characteristics. These in turn continually affect the combustion process in the boilers.

Normally, bagasse generated in the mill is fed directly to the boilers, without any intermediate storage. No blending or further processing of the bagasse takes place prior to combustion in the boilers. This characteristic of bagasse boilers differs from other biomass-fired boilers. Because the boilers receive the bagasse as it is produced, the performance of the boilers can be adversely affected when there is variability in the moisture content, particle size distribution, or other characteristics of the bagasse being produced by the sugar mill. Since the bagasse fuel characteristics often fluctuate significantly, particularly moisture content, there often is considerable variability (minute-to-minute and hour-to-hour) in the CO concentrations and emissions from bagasse boilers. Various authors have studied the effects of these combustion characteristics on bagasse boilers, and in particular CO emissions, as presented in Section 6.0.

All of the mill's boilers are tied into a single steam header, which provides high-pressure steam to the sugar mill tandems that grind the sugarcane. The integrated operations of the boilers and the sugar mill tandems is a unique feature of sugar mills. High-pressure steam is also provided to steam turbine electrical generators, and low pressure steam is provided to the raw sugar manufacturing process.
Because all of the operations are integrated (i.e., linked together), the boilers' emission rates are affected by mill steam demand, mill upsets, startups/shutdowns, and other events occurring in the mills that affect steam consumption and affect the steam load on the boilers. Operating conditions in one boiler can also adversely affect the other boilers, again due to the effect on steam demand.

Section 6.0 contains additional technical information concerning the unique design features of bagasse boilers. Section 6.0 also contains additional technical information comparing bagasse boilers to wood- fired boilers. This information further demonstrates the significant differences between bagasse boilers and other biomass and wood-fired boilers.

4.0 EPA'S STATUTORY AUTHORITY TO CREATE SUBCATEGORIES

Section 112 of the CAA contains the statutory requirements for establishing emission standards for industrial boilers based on the use of maximum achievable control technology (MACT). Section 112(d)(1) of the CAA expressly authorizes EPA to establish subcategories:

The [EPA] Administrator shall promulgate regulations establishing emission standards for each category or subcategory of major sources... The Administrator may distinguish among classes, types, and sizes of sources within a category or subcategory in establishing such standards...

Section 129 of the CAA also authorizes EPA to distinguish between classes, types, and sizes of units when setting MACT standards for incinerators. When construing Section 129, the U.S. Court of Appeals noted that EPA has "broad discretion to differentiate among units in a category" while setting MACT standards. Northeast Maryland Waste Disposal Authority v. EPA, 358 F.3d 936, 946 (D.C. Cir. 2004). The court concluded that the term "class" is "not defined in the Clean Air Act, and the dictionary definition – „a group, set, or kind marked by common attributes' – could hardly be more flexible." Id. The court's analysis implies that EPA may reasonably establish subcategories based on a "class" whenever EPA finds that there is a "group, set, or kind" of unit (boiler, incinerator, etc.) marked by common attributes.

EPA has exercised its discretionary authority to create subcategories in many prior MACT rulemaking proceedings. For example, EPA previously created subcategories when EPA set the MACT emissions standards for industrial boilers, electric utility steam generating units, and municipal waste combustors.

EPA created these subcategories because EPA wanted to account for the differences between source types, the types of fuel used, the size of the regulated units, and other factors. In EPA's "Notice of

Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating

Units" [Federal Register (FR), December 20, 2000], EPA stated:

In developing standards under Section 112(d) to date, the EPA has based subcategorization on considerations such as: the size of the facility, the type of fuel used at the facility, and the plant type. The EPA may also consider other relevant factors such as geographic conditions in establishing subcategories.

In EPA's 2004 MACT proposal for electric utility steam generating units (Utility MACT) (FR, January 30,

2004), EPA stated that it has broad discretion to create subcategories based on these same criteria (i.e., size of the facility, type of fuel used, and plant type) [p. 4664]. In addition, "EPA also is free to consider other relevant factors, such as geographic factors, process design or operation, variations in emission profiles, or differences in the feasibility of application of control." [p. 4664]. In the Utility MACT,

EPA exercised its discretion by proposing to create five separate subcategories for coal-fired electric utility boilers [p. 4666]. Four of the proposed subcategories were based on the type of coal burned

(i.e., bituminous/anthracite, sub-bituminous, lignite, and coal refuse). The fifth subcategory was based on the type of process used by the utility to convert coal into electricity (i.e., integrated gasification combined cycle technology).

In EPA's 2008 MACT proposal for mercury cell chlor-alkali plants (73 FR 33258; June 11, 2008), EPA noted that "EPA's broad authority to establish categories and subcategories of industry sources is firmly established, and has been recognized as entitled to substantial deference by the U.S. Court of Appeals for the D.C. Circuit and the U.S. Supreme Court." [p. 33273]. In defense of its decision to create a subcategory for mercury cell chlor-alkali plants, EPA stated that "we have a long history of using subcategorization....

Subcategories, or subsets of similar emission sources within a source category, may be defined if technical differences in emissions characteristics, processes, control device applicability, or opportunities for pollution prevention exist within the source category. This policy is supported by Section 112(d)(1), the legislative history, our prior rulemakings, and judicial precedent." (emphasis added) [Id.]

Most recently in EPA's 2010 MACT proposal for industrial boilers (FR, June 4, 2010), EPA stated that the

CAA allows EPA to divide source categories into subcategories based on differences in class, type or size

[p. 32016]. EPA states:

For example, differences between given types of units can lead to corresponding differences in the nature of emissions and the technical feasibility of applying emission control techniques. The design, operating, and emissions information that EPA has reviewed indicates differences in unit design that distinguish different types of boilers. Data indicate that there are significantdesign and operational differences between units that burn coal, biomass, liquid, and gaseous fuels. Boiler systems are designed for specific fuel types and will encounter problems if a fuel with characteristics other than those originally specified is fired.... The design of the boiler or process heater, which is dependent in part on the type of fuel being burned, impacts the degree of combustion. Boilers and process heaters emit a number of different types of HAP emissions. Organic HAP are formed from incomplete combustion and are influenced by the design and operation of the unit. The degree of combustion may be greatly influenced by three general factors: Time, turbulence, and temperature. Within the basic unit types there are different designs and combustion systems that, while having a minor effect on fuel-related HAP emissions, have a much larger effect on organic HAP emissions. Therefore, we decided to further subcategorize based on these different unit designs but only in proposing standards for organic HAP emissions.

EPA has previously used criteria such as furnace heat release rate in developing New Source Performance Standards (NSPS) subcategories for boilers. For example, Title 40, Part 60 of the Code of Federal Regulations (40 CFR 60), Subpart Db, contains separate NO x limits for low heat release rate boilers and high heat release rate boilers burning fuel oil. For purposes of Subpart Db, a high heat release rate is defined as greater than 70,000 Btu/hr-ft3 and a low heat release rate as less than or equal to 70,000 Btu/hr-ft3.

Another example of EPA using subcategories to set emission standards involved the NSPS for municipal waste combustors (MWCs) in 40 CFR 60, Subpart Ea. In this rulemaking, EPA set new standards for two categories of MWC unit types. In the 1995 emission guidelines, EPA identified three distinct types of MWC units that burn refuse-derived fuel (RDF), as follows: (1) RDF stoker, (2) pulverized coal/RDF mixed fuel-fired combustor, and (3) spreader stoker coal/RDF mixed fuel-fired combustor. Recently, EPA identified two additional types of RDF-fired MWC designs that do not fit within the three types of RDF combustors defined in the regulations. Since none of the three previous subcategories of RDF municipal waste combustors correctly describe the design or operation of these particular units, EPA recognized a need to add combustor types that would adequately describe and set CO emission limits for these

combustors. The EPA therefore added definitions for "spreader stoker RDF-fired combustor/100 percent coal capable" and "semi-suspension RDF-fired combustor/wet RDF process conversion." This latter subcategory was defined as follows:
Semi-suspension refuse-derived fuel-fired combustor/wet refuse-derived fuel process conversion means a combustion unit that was converted from a wet refuse-derived fuel process to a dry refuse-derived fuel process, and because of con

Response: Please refer to the preamble for discussion of a combined grate/suspension firing subcategory. This subcategory includes bagasse units however is based on design features, and is not specific to fuel type. Bagasse boilers that have a fuel cell combustor design will be covered under the fuel cell category.

See response to comment EPA-HQ-OAR-2002-0058-2987.1, excerpt 3 for general requests for additional subcategories.

Commenter Name: Arlington Public Hearing Transcript
Commenter Affiliation: See transcript for detailed list of commenters
Document Control Number: EPA-HQ-OAR-2002-0058-1779
Comment Excerpt Number: 5

Comment: Finally, some boilers are used for limited periods of time for back-up and should be treated differently than boilers running day in and day out.

Response: Please refer to the preamble for discussion of the limited use subcategory.

Commenter Name: Arlington Public Hearing Transcript
Commenter Affiliation: See transcript for detailed list of commenters
Document Control Number: EPA-HQ-OAR-2002-0058-1779
Comment Excerpt Number: 59

Comment: EPA can mitigate this burden OF two regulations on EGUS by establishing a separate subcategory for small municipal utilities and setting a compliance schedule for us that is consistent with the schedule for large investor-owned utilities to comply with the Utility MACT.

Response: See response to comment EPA-HQ-OAR-2002-0058-2795.1, excerpt 1 for additional subcategory for small municipal utilities or subcategorizing according to sector.

Commenter Name: Arlington Public Hearing Transcript
Commenter Affiliation: See transcript for detailed list of commenters
Document Control Number: EPA-HQ-OAR-2002-0058-1779
Comment Excerpt Number: 63

Response: See response to comment EPA-HQ-OAR-2002-0058-2818.1, excerpt 18 for subcategorizing according to heat input size.

Commenter Name: Timothy Hunt
Commenter Affiliation: American Forest and Paper Association (AF&PA)
Document Control Number: EPA-HQ-OAR-2002-0058-3213.1
Comment Excerpt Number: 143

Comment: EPA has developed subcategories of boilers under the proposed rule by fuel type, and in some cases, boiler type. We believe that it is appropriate to develop subcategories based on these criteria, as it recognizes the differences in boiler design, operation, and emissions. For example, a solid-fired unit having the combustion occur on a grate has different challenges for optimizing the fuel-air ratio than that of a unit in which the combustion occurs in suspension. Combustion on a grate is subject to piling and smoldering that cannot simply be controlled by increasing the amount of excess air, yet can cause CO emissions to spike unexpectedly.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 148 for further subcategorization by fuel type.
See response to comments EPA-HQ-OAR-2002-0058-2916, excerpt 2 and EPA-HQ-OAR-2002-0058-2702.1, excerpt 54 for subcategories for based on design type, and for cyclone, firetube, and hybrid watertube-firetube boilers.

Commenter Name: Timothy Hunt
Commenter Affiliation: American Forest and Paper Association (AF&PA)
Document Control Number: EPA-HQ-OAR-2002-0058-3213.1
Comment Excerpt Number: 145

Comment: EPA has broad discretion to establish subcategories of sources. Section 112 provides EPA with explicit authority "to establish subcategories under this section, as appropriate." § 112 (c)(1); see also §112 (c)(5) ("... the Administrator may at any time list additional categories and subcategories of sources[.]"). Indeed, § 112 establishes a presumption in favor of the creation and modification of categories and subcategories in the course of the Agency's regulatory program, by mandating that EPA "shall from time to time, but no less often than every 8 years, revise, if appropriate, in response to public comment or new information, a list of all categories and subcategories of major sources[.]" §112(c)(1).
Section 112(c)(1)'s language empowering EPA "to establish subcategories ... as appropriate" without the inclusion of criteria limiting the Agency's ability to do so confers a broad grant of authority. The D.C. Circuit previously has interpreted the inclusion of the phrase "as appropriate" in a more limiting statutory mandate as conferring substantial discretion. Consumer Federation of America v. U.S. Dept. of Health and Human Services, 83 F.3d 1497 (D.C. Cir. 1996).
At issue was a provision of the Clinical Laboratory Improvement Amendments of 1988, which directed HHS to establish qualifications for laboratory technicians that "shall, as appropriate, be

different on the basis of the type of examinations and processes being performed[.]" Id. at 1503. The court found that, even though the statutory mandate at issue – using the word "shall" – was phrased in a way generally interpreted to impose a mandatory duty to differentiate qualifications based on different types of tests, the inclusion of the words "as appropriate" removed the mandatory nature of this provision and introduced a significant amount of agency discretion in its implementation. Id. To hold otherwise, concluded the court, would treat the statutory terms "as appropriate" as mere surplussage, thereby violating a basic canon of statutory construction. Id. In the CAA context, the mandate conferred by §112 to establish subcategories "as appropriate" similarly provides substantial discretion for EPA to create subcategories on any reasonable basis. Nothing in the Act or applicable caselaw suggests otherwise.

While EPA has nearly unfettered discretion to create subcategories as appropriate, the CAA provides ample authority for EPA to distinguish among groups of sources within a source category or subcategory in setting a MACT standard. The statute provides that EPA "may distinguish among classes, types and sizes of sources within a category or subcategory" when establishing MACT standards. 42 U.S.C. § 7412(d)(1) (emphasis added). Congress' use of the broad terms "class," "type," and "size" shows that EPA is intended to have broad discretion in the appropriate factors that warrant distinguishing among sources, and EPA's proposed subcategories fall squarely within the meaning of "types" and "sizes."

It is a well-established canon of statutory construction that courts "give the words of a statute their ordinary, contemporary, common meaning, absent an indication Congress intended them to bear some different import." Williams v. Taylor, 529 U.S. 420, 431, 120 S.Ct. 1479, 1487-88, 146 L.Ed.2d 435 (2000). Accordingly, we turn to the standard definitions of "class," "type" and "size." Webster's Third New International Dictionary Unabridged (1993) defines "class" to mean "a group, set or kind marked by common attributes or a common attribute." It defines "type" as "qualities common to a number of individuals that serve to distinguish them as an identifiable class or kind," further clarifying that "'[t]ype', 'kind' and 'sort' are usually interchangeable" and that "'kind' in most uses is likely to be very indefinite and involve any criterion of classification whatsoever." To the extent that EPA may distinguish among sources within a category or subcategory on the basis of "any [reasonable] criterion of classification whatsoever," and may create subcategories as appropriate, the CAA strongly supports EPA's authority to create subcategories of industrial boilers as proposed.

Response: The EPA thanks the commenters for their support and recognonition of EPA's authority to create subcategories based on legislative history, case law and the CAA.

Commenter Name: Timothy Hunt
Commenter Affiliation: American Forest and Paper Association (AF&PA)
Document Control Number: EPA-HQ-OAR-2002-0058-3213.1
Comment Excerpt Number: 146

Comment: The legislative history makes clear that Congress intended EPA to distinguish among classes, types and sizes of sources under three core circumstances: when differences among sources affect (1) the feasibility of air pollution control technology; (2) the effectiveness of air pollution control technology; and (3) the cost of control.

The Senate Report clarifies that the Administrator should:

"take into account factors such as industrial or commercial category, facility size, type of process and other characteristics of sources which are likely to affect the feasibility and effectiveness of air pollution control technology. Cost and feasibility are factors which may be considered by the Administrator when establishing an emission limitation for a category under section 112. The proper definition of categories, in light of available pollution control technologies, will assure maximum protection of public health and the environment while minimizing costs imposed on the regulated community. However, in limited circumstances where a group of sources may share the characteristics of other sources in the category, the Administrator may establish subcategories for such sources." S. Rep. No. 228, 101st Cong., 1st Sess 166.

Thus, in the view of the Senate, the standard for establishing categories and subcategories is essentially the same, although the Administrator is cautioned not to make too rampant use of subcategories.

The House Report similarly provides: "EPA may distinguish among classes, types and sizes of sources within a category or subcategory. . . . In the determination of MACT for new and existing sources, consideration of cost should be based on an evaluation of the cost of various control options. The Committee expects MACT to be meaningful, so that MACT will require substantial reductions in emissions from uncontrolled levels. However, MACT is not intended to require unsafe control measures, or to drive sources to the brink of shutdown." House Rep. No. 101-490, Part 1, at 328.

In sum, while Congress intended the MACT program to achieve significant emissions reductions, it also intended EPA to be cognizant of the costs of control, and to ensure that the program did not cause significant economic hardship. One primary mechanism for achieving this goal is through the use of subcategories; subcategorization enables the Agency to account for the fact that distinctions among classes, types and sizes of sources may have a very real impact on the feasibility of a given control technology, the effectiveness of that control technology, and the cost of control.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Timothy Hunt
Commenter Affiliation: American Forest and Paper Association (AF&PA)
Document Control Number: EPA-HQ-OAR-2002-0058-3213.1
Comment Excerpt Number: 147

Comment: The only case to interpret the "classes, types and sizes" language supports this interpretation. Sierra Club v. Costle, 657 F.2d 298 (D.C. Cir. 1981), recognized the broad discretion this language confers on EPA to create what in effect are subcategories of sources with differentiated emission standards. This decision interpreted identical statutory language found in the New Source Performance Standards (NSPS) provisions of § 111 of the CAA. Under the "classes, types and sizes" language, the Sierra Club court upheld a variable NSPS SO_2 reduction requirement that was tied to a source's existing SO_2 emissions levels which, in turn, depended on the sulfur content of the facility's fuel. The Court noted that "[t]he required finding that must underlie a variable standard is much broader than a mere determination that uniformity is not achievable. Rather, EPA has the discretion to vary the standard upon finding that such a departure (from uniform control) does not undermine the basic purposes of the Act." Id. at 321. On this basis, the Court expressly upheld EPA's subcategorization of coal-fired power plants based on the sulfur content of fuel, finding that "[c]ertainly the text of the statute nowhere forbids a distinction based on sulfur." See id. at 319. More generally, the Sierra Club decision confirms EPA's discretion to set differentiated emissions standards for groups of sources within a category – i.e, for subcategories – even in instances where the strictest standard may be achievable by all sources.

The Report further provides that "Nothing in this language authorizes the establishment of a category based wholly on economic grounds, nor is there any implication that individual facilities may be granted categorical waivers … based on assertions of extraordinary economic effect." Id. In other words, the cost of control is an appropriate basis for distinguishing among sources so long as it is not the only basis that distinguishes among those sources.

The Court's analysis in Sierra Club has obvious relevance to an analysis of the authority granted to EPA through CAA § 112. Section 112 employs the same language as Section 111 in defining when EPA may promulgate distinct emission standards for sources within a category or subcategory. The Supreme Court consistently has held that "when administrative and judicial interpretations have settled the meaning of an existing statutory provision, repetition of the same language in a new statute indicates, as a general matter, the intent to incorporate its administrative and judicial interpretations as well." Bragdon v. Abbott, 524 U.S. 634, 645 (1998). Therefore, § 112, which adopted § 111's terms almost ten years after the D.C. Circuit issued the Sierra Club decision, must be understood to carry the settled meaning given to those terms by Sierra Club.

Response: See response to comment EPA-HQ-OAR-2002-0058-2960.1, excerpt 61 for additional subcategory based on regional fuel availability or geographic location.
See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Timothy Hunt
Commenter Affiliation: American Forest and Paper Association (AF&PA)
Document Control Number: EPA-HQ-OAR-2002-0058-3213.1
Comment Excerpt Number: 148

Comment: EPA's past practice has been consistent with this interpretation of the Act. The Agency has subcategorized sources in numerous industrial categories. From this experience, it is possible to distill several principles that have guided the Agency's decision making with regard to creation of subcategories. First, EPA has determined that subcategorization is appropriate where sources use different processes, and those processes result in different types or concentrations of uncontrolled HAPs. Here, for example, the suite of HAPs emitted by solid-fueled boilers differs from that emitted by liquid-fueled boilers, which in turn differs from that emitted by gas-fueled boilers. For example, the types of metals emitted by solid-fueled boilers differs from the types of metals emitted by liquid-fueled boilers– and gas-fueled boilers typically emit little metals, but may emit more organic HAPs. See 68 Fed. Reg. at 1670. Thus, subcategorization based on fuel type is appropriate because the different types of boilers emit different types of HAPs.

Response: The EPA disagrees with commenter's suggestion to further subcategorize by fuel type. Although the EPA recognizes the variation in emissions between different fuel types, many units burn a mixture of fuel types and EPA determined that its combustor design-based classifications for organic HAP pollutants appropriately distinguish between operating and design characteristics of boilers that burn a single fuel type. The EPA also considers that variability has been incorporated into the MACT floor analysis because the emission limits developed for the MACT floor level of control incorporate boilers using various fuels and variations of control devices.

Commenter Name: Timothy Hunt
Commenter Affiliation: American Forest and Paper Association (AF&PA)
Document Control Number: EPA-HQ-OAR-2002-0058-3213.1
Comment Excerpt Number: 149

Comment: The Agency has subcategorized sources based on size, where size differences affect the performance of control technologies, such as where more frequent start up and shut down makes it more difficult for smaller sources to maintain the same level of control as larger sources. That is also the case here. There are fundamental differences in the design of small boilers, as compared to large boilers. Moreover, smaller units often are used in swing load mode, whereas larger units more typically are base-loaded. These smaller boilers have more frequent start ups and shut downs that impact the performance of control technology, and hence the achievability of the standard. Thus, subcategorization of boilers based on size – or infrequent utilization – also is consistent with EPA's past precedent and is appropriate because of the impact of these factors on the ability of these sources to maintain the same level of control as larger sources.

Response: See response to comment EPA-HQ-OAR-2002-0058-2818.1, excerpt 18 for subcategorizing according to heat input size.

Please refer to the preamble for discussion of the limited use subcategory.

Commenter Name: Timothy Hunt
Commenter Affiliation: American Forest and Paper Association (AF&PA)
Document Control Number: EPA-HQ-OAR-2002-0058-3213.1
Comment Excerpt Number: 150

Comment: Furthermore, the Agency has subcategorized sources where differences among sources affect the applicability of control technology. For example, EPA created subcategories in the 1999 polyether polyols production MACT standard, finding that "[s]ubcategorization was necessary due to the distinctively different nature of the epoxide and THF processes and its effect on the applicability of controls." Similarly, in the 1998 flexible polyurethane foam production MACT standard, EPA found that "[s]ubcategorization was necessary to reflect major variations in production methods, and/or HAP emissions that affect the applicability of controls." Based on similar rationales, EPA created subcategories in the Group I polymers and resins MACT and the primary aluminum production MACT, and proposed to create subcategories in the polyurethane foam production MACT. Here, for example, fabric filters may be an appropriate control technology to capture metals from coal-fired boilers, but are not appropriate for use on oil-fired boilers because the soot blinds the bags of the fabric filter, and is also a fire hazard. Thus, subcategorization based on fuel type is appropriate because the type of fuel affects the applicability of control technology.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 148 for further subcategorization by fuel type.

Commenter Name: Matthew Todd and David Friedman
Commenter Affiliation: American Petroleum Institute (API) and National Petrochemical and Refiners Association (NPRA)
Document Control Number: EPA-HQ-OAR-2002-0058-2960.1
Comment Excerpt Number: 61

Comment: Imposing emission limits on liquid-fired boilers and process heaters, versus work practice requirements for most gas-fired boilers and process heaters, will tend to drive sources to replace liquid-fired units with natural gas-fired units. However, some facilities do not have this option. For instance, some facilities in Alaska and those on isolated islands (e.g., Hawaii and the Virgin Islands) have no option to use imported gaseous fuels rather than liquid fuels to meet their fuel balance needs and in most of these cases, even the choice of liquid fuels is quite restricted.

Refineries and crude loading facilities located on islands or remote locations, such as Alaska, have unique configurations and constraints that mainland refineries and loading facilities do not. One of the key constraints is that islands and remote locations cannot physically access natural gas pipelines. This makes the burning of liquid fuels (produced on site or purchased locally) an unavoidable part of doing business in those locations, as EPA observes in the rule preamble. Moreover, the dual fired heaters used at many island/remote facilities are a very different design than EPA apparently contemplated in establishing subcategories and this design also affects the combustion chamber design.

In these situations, facilities are also limited in what liquid fuels they can use. They may have only one practical supplier of fuel oil. For refineries that is typically the refinery itself. The HAP metals and chlorine content of those liquid fuels is set by the refinery crude slate and process. These facilities do not have an option to seek out lower metal or chloride fuels and must use what is produced or available locally. In his concurring opinion in the Brick MACT case, Judge Williams stated that EPA's ability to create subcategories for sources of different classes, size, or

(3) limited use stationary RICE, (4) stationary RICE that combust landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, and (5) other stationary RICE. We further divided the last subcategory into four subcategories: (1) 2SLB stationary RICE, (2) 4SLB stationary RICE, (3) 4SRB stationary RICE, and (4) CI stationary RICE.

Recommendation: Use further subcategorization to address special situations, such as limited use boilers and process heaters; turndown, startup and shutdown operations, and boilers and process heaters located at facilities without access to natural gas.

Response: Please refer to the preamble for discussion of the limited use subcategory.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-2702.1
Comment Excerpt Number: 46

Comment: CIBO Strongly Supports EPA's Proposal to Create Subcategories of Industrial Boilers and Process Heaters.
CIBO strongly supports EPA's proposal to subcategorize industrial boilers and process heaters based on the physical state of the fuel burned. CIBO agrees with EPA's conclusion that "there are significant design and operational differences between units that burn coal, biomass, liquid, and gaseous fuels" and that "[b]oiler systems are designed for specific fuel types and will encounter problems if a fuel with characteristics other than those originally specified is fired." 75 FR 32017. These subcategories therefore reflect significant technological differences with corresponding differences in the nature, composition, and controllability of HAP emissions, as well as the cost of control. CIBO similarly supports EPA's ability to subcategorize further among units firing fuel of the same physical state based on size and extent of use. The design and construction of large and small units reflect further technological differences that affect the nature, composition, and controllability of HAP emissions.

Response: See response to comment EPA-HQ-OAR-2002-0058-2818.1, excerpt 18 for subcategorizing according to heat input size.
See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-2702.1
Comment Excerpt Number: 48

Comment: EPA has Abundant Legal Authority to Create Subcategories as Proposed.

EPA has broad discretion to establish subcategories of sources. Section 112 provides EPA with explicit authority "to establish subcategories under this section, as appropriate." § 112(c)(I); see also § 112(c)(5) (" ...the Administrator may at any time list additional categories and subcategories of sources[.],,). Indeed, § 112 establishes a presumption in favor of the creation and modification of categories and subcategories in the course of the Agency's regulatory program, by mandating that EPA "shall from time to time, but no less often than every 8 years, revise, if appropriate, in response to public comment or new information, a list of all categories and subcategories of major sources." § 112(c)(I). Section 112(c)(I)'s language empowering EPA "to establish subcategories ... as appropriate" without the inclusion of criteria limiting the Agency's ability to do so confers a broad grant of authority.

The D.C. Circuit previously has interpreted the inclusion of the phrase "as appropriate" in a more limiting statutory mandate as conferring substantial discretion. Consumer Federation of America v. U.S. Dept. of Health and Human Services, 83 F.3d 1497 (D.C. Cir. 1996) (Consumer Federation). At issue in Consumer Federation was a provision of the Clinical Laboratory Improvement Amendments of 1988 (CLIA), which directed HHS to establish qualifications for laboratory technicians that "shall, as appropriate, be different on the basis of the type of examinations and processes being performed." Consumer Federation, 83 F.3d at 1503.

The court found that, even though the statutory mandate at issue-using the word "shall"-was phrased in a way generally interpreted to impose a mandatory duty to differentiate qualifications based on different types of tests, the inclusion of the words "as appropriate" removed the mandatory nature of this provision and introduced a significant amount of agency discretion in its implementation. Consumer Federation, 83 F.3d 1497. To hold otherwise, concluded the court, would treat the statutory terms "as appropriate" as mere surplussage, thereby violating a basic canon of statutory construction. Consumer Federation, 83 F.3d 1497. In the CAA context, the mandate conferred by § 112 to establish subcategories "as appropriate" similarly provides substantial discretion for EPA to create subcategories on any reasonable basis. Nothing in the Act or applicable case law suggests otherwise.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-2702.1
Comment Excerpt Number: 49

Comment: EPA Has Broad Discretion to Distinguish Among Classes, Types and Sizes of Sources, Even Within Subcategories.
While EPA has nearly unfettered discretion to create subcategories as appropriate, the CAA provides ample authority for EPA to distinguish among groups of sources within a source category or subcategory in setting a MACT standard. The statute provides that EPA "may distinguish among classes, types and sizes of sources within a category or subcategory" when

establishing MACT standards. 42 U.S.C. § 7412(d)(I). Congress's use of the broad terms "class," "type," and "size" shows that EPA is intended to have broad discretion in the appropriate factors that warrant distinguishing among sources, and EPA's proposed subcategories fall squarely within the meaning of "types" and "sizes." It is a well-established canon of statutory construction that courts "give the words of a statute their ordinary, contemporary, common meaning, absent an indication Congress intended them to bear some different import." Williams v. Taylor, 529 U.S. 420, 431 (2000) (quotations omitted).

Accordingly, we turn to the standard definitions of "class," "type" and "size." Webster's Third New International Dictionary Unabridged (1993) defines "class" to mean "a group, set or kind marked by common attributes or a common attribute." It defines "type" as "qualities common to a number of individuals that serve to distinguish them as an identifiable class or kind," further clarifying that "[t]ype", "kind" and "sort" are usually "interchangeable and that "kind" in most uses is likely to be very indefinite and involve any criterion of classification whatsoever." To the extent that EPA may distinguish among sources within a category or subcategory on the basis of "any [reasonable] criterion of classification whatsoever," and may create subcategories as appropriate, the CAA strongly supports EPA's authority to create subcategories of industrial boilers as proposed.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-2702.1
Comment Excerpt Number: 50

Comment: Congress Contemplated and Approved Subcategorization.
The legislative history makes clear that Congress intended EPA to distinguish among classes, types and sizes of sources under three core circumstances: when differences among sources affect (1) the feasibility of air pollution control technology; (2) the effectiveness of air pollution control technology; and (3) the cost of control: The Senate Report clarifies that the Administrator should: take into account factors such as industrial or commercial category, facility size, type of process and other characteristics of sources which are likely to affect the feasibility and effectiveness of air pollution control technology. Cost and feasibility are factors which may be considered by the Administrator when establishing an emission limitation for a category under section 112. The proper definition of categories, in light of available pollution control technologies, will assure maximum protection of public health and the environment while minimizing costs imposed on the regulated community. However, in limited circumstances where a group of sources may share the characteristics of other sources in the category, the Administrator may establish subcategories for such sources. S. Rep. No. 228, 101st Cong., 1st Sess 166.

Thus, in the view of the Senate, the standard for establishing categories and subcategories is essentially the same, although the Administrator is cautioned not to make too rampant use of subcategories. The House Report similarly provides: "EPA may distinguish among classes, types and sizes of sources within a category or subcategory.... In the determination of MACT for new and existing sources, consideration of cost should be based on an evaluation of the cost of various control options. The Committee expects MACT to be meaningful, so that MACT will require substantial reductions in emissions from uncontrolled levels. However, MACT is not intended to require unsafe control measures, or to drive sources to the brink of shutdown." House Rep. No. 101-490, Part 1, at 328. In sum, while Congress intended the MACT program to achieve significant emissions reductions, it also intended EPA to be cognizant of the costs of control, and to ensure that the program did not cause significant economic hardship. One primary mechanism for achieving this goal is through the use of subcategories; subcategorization enables the Agency to account for the fact that distinctions among classes, types and sizes of sources may have a very real impact on the feasibility of a given control technology, the effectiveness of that control technology, and the cost of control.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-2702.1
Comment Excerpt Number: 51

Comment: Variation of Emission Standards on the Basis of Fuel Type is Valid.
The only case to interpret the "classes, types and sizes" language that supports this interpretation. Sierra Club v. Costle, 657 F.2d 298 (D.C. Cir. 1981) recognized the broad discretion this language confers on EPA to create what in effect are subcategories of sources with differentiated emission standards. This decision interpreted identical statutory language found in the New Source Performance Standards (NSPS) provisions of § 111 of the CAA. Under the "classes, types and sizes" language, the Sierra Club v. Costle court upheld a variable NSPS S02 reduction requirement that was tied to a source's existing S02 emissions levels which, in turn, depended on the sulfur content of the facility's fuel. The Court noted that "[t]he required finding that must underlie a variable standard is much broader than a mere determination that uniformity is not achievable. Rather, EPA has the discretion to vary the standard upon finding that such a departure (from uniform control) does not undermine the basic purposes of the Act." Sierra Club v. Costle, 657 F.2d at 321 (quotations omitted). On this basis, the Court expressly upheld EPA's subcategorization of coal-fired power plants based on the sulfur content of fuel, finding that "[the text of the statute nowhere forbids a distinction based on sulfur." Sierra Club v. Costle, 657 F.2d at 319.

More generally, the Sierra Club v. Costle decision confirms EPA's discretion to set differentiated emissions standards for groups of sources within a category (i.e., for subcategories) even in instances where the strictest standard may be achievable by all sources. The court's analysis in

Sierra Club v. Costle has obvious relevance to an analysis of the authority granted to EPA through CAA § 112. Section 112 employs the same language as § 111 in defining when EPA may promulgate distinct emission standards for sources within a category or subcategory. The Supreme Court consistently has held that "when administrative and judicial interpretations have settled the meaning of an existing statutory provision, repetition of the same language in a new statute indicates, as a general matter, the intent to incorporate its administrative and judicial interpretations as well." Bragdon v. Abbott, 524 U.S. 634, 645 (1998). Therefore, § 112, which adopted § 111's terms almost ten years after the decision in Sierra Club v. Costle, must be understood to carry the settled meaning given to those terms by Sierra Club.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 148 for further subcategorization by fuel type.
See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-2702.1
Comment Excerpt Number: 52

Comment: EPA's Past Practice Regarding Subcategorization is Consistent with the Proposed Subcategories.
EPA's past practice has been consistent with this interpretation of the Act. The Agency has subcategorized sources in numerous industrial categories. From this experience, it is possible to distill several principles that have guided the Agency's decision making with regard to creation of subcategories. First, EPA has determined that subcategorization is appropriate where sources use different processes, and those processes result in different types or concentrations of uncontrolled HAPs. Here, for example, the suite of HAPs emitted by solid-fueled boilers differs from that emitted by liquid-fueled boilers, which in turn differs from that emitted by gas-fueled boilers. For example, the types of metals emitted by solid-fueled boilers differs from the types of metals emitted by liquid-fueled boilers, and gas-fueled boilers typically emit little metals, but may emit more organic HAPs. Thus, subcategorization based on fuel type is appropriate because the different types of boilers emit different types of HAPs. The Agency also has subcategorized sources based on size, where size differences affect the performance of control technologies.

That is also the case here. Thus, subcategorization of boilers based on size, or infrequent utilization, also is consistent with EPA's past precedent and is appropriate because of the impact of these factors on the ability of these sources to maintain the same level of control as larger sources. Furthermore, the Agency has subcategorized sources where differences among sources affect the applicability of control technology. For example, EPA created subcategories in the 1999 polyether polyols production MACT standard, finding "Subcategorization was necessary due to the distinctively different nature of the epoxide and THF processes and its effect on the applicability of controls." Similarly, in the 1998 flexible polyurethane foam production MACT standard, EPA found that "Subcategorization was necessary to reflect major variations in production methods, and/or HAP emissions that affect the applicability of controls." Based on similar rationales, EPA created subcategories in the Group 1 polymers and resins MACT and the primary aluminum production MACT, and proposed to create subcategories in the polyurethane foam production MACT. Subcategorization based on fuel type is appropriate because the type of fuel affects the applicability of control technology.

EPA also has created subcategories in numerous cases where differences among sources affected the performance of control technology and, hence, the achievability of the MACT standard. For example, in the steel pickling MACT, EPA excluded specialty steel because the technology that is effective for removing acid gas (HCl) emissions from carbon steel manufacturing "may not be as effective" for removing acid gas (H2S04) emissions from specialty steel manufacturing. Similarly, the phosphoric acid manufacturing MACT subcategorized the submerged combustion process and the vacuum evaporation process because the "submerged combustion process is not amenable to the same level of control as is the vacuum evaporation process." In the leather finishing operations MACT, EPA "observed differences in achievable emission levels between the types of leather products produced ... [and therefore] we have established four different performance standards for the various leather products produced." And in the proposed secondary aluminum production MACT, EPA "examined the processes, the process operations, and other factors to determine if separate classes of units, operations, or other criteria have an effect on air emissions from emission sources, or the controllability of those emissions." In sum, EPA's proposed subcategories are amply supported by the language of the statute, the legislative history, applicable case law and the Agency's own past practices.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-2702.1
Comment Excerpt Number: 53

Comment: Need limited use subcategory for liquid or gas 2 units based on 10% annual Capacity factor or 1,000 hours/year as a threshold.
EPA should establish a subcategory for "limited use" units due to their significant differences from steady-state units. Limited use units should have a rated heat input greater than 10 MMBtu/hr with an annual average capacity factor of 10 percent or less. These units operate for short periods of time during the year and as such may experience relatively little SSM. The short run times would likely exacerbate the effect of startup/shutdown on 30 day averages. Because limited use units do not operate regularly, their emissions differ from average boilers operating for longer periods of time or near their design capacity. EPA has recognized that "units operate most efficiently when operated at or near their design capacity." 75 FR 32023-24. Based on their operating schedule, limited use units may or may not operate at or near their design capacity, but if they do it is for limited periods of time. Considering this, limited use units may operate for a

For these same reasons, EPA should consider both the necessity of maintenance and readiness testing, as well as participation in emergency demand response programs and other "non-emergency" uses in setting the parameters for a limited use subcategory. While limits based on hours of operation like those used in the CI RICE MACT are one option, another and potentially easier standard to administer would be to rely on capacity utilization. Boilers, unlike RICE, cannot start up or shut down quickly, making it difficult for boiler operators to run a boiler for only a set number of hours. An hours-of-operation limit, therefore, would be less practical than a limit based on capacity utilization. Moreover, as EPA noted in the Proposed Rule, some emissions from boilers are not dependent on operating parameters such as hours operated, but rather on the fuel consumed. See National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines, 75 Fed. Reg. at 32017 (discussing fuel-dependent HAP). A capacity utilization factor of 10% was chosen for the previous Boiler MACT final rule as the best means of defining a limited use unit. See National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters; Final Rule, 69 Fed. Reg. at 55223. This definition is equally appropriate for the current rule.

Response: Please refer to the preamble for discussion of the limited use subcategory.

Commenter Name: Jim Griffin
Commenter Affiliation: American Chemistry Council
Document Control Number: EPA-HQ-OAR-2002-0058-2792.1
Comment Excerpt Number: 75

Comment: EPA has broad discretion to establish subcategories of sources. Section 112 provides EPA with explicit authority "to establish subcategories under this section , as appropriate." [70 Fed. Reg. 59462 (October 12, 2005).] Indeed, section 112 establishes a presumption in favor of the creation and modification of categories and subcategories in the course of the Agency' regulatory program, by mandating that EPA 'shall from time to time, but no less often than every 8 years, revise, if appropriate, in response to public comment or new information, a list of all categories and subcategories of major sources."[Clean Air Act section 112 (c)(1); see also section 112 (c)(5) ("... the Administrator may at any time list additional categories and subcategories of sources."] section 112(c)(1). The fact that section 112 empowers EPA to establish subcategories without any limiting criteria confers a broad grant of authority. [Consumer Federation of America v. U.S. Dept. of Health and Human Services, 83 F.3d 1497 (D.C. Cir. 1996) (interpreting the phrase "as appropriate" in a more limiting statutory mandate as conferring substantial discretion).] Nothing in the Act or applicable case law suggests otherwise.

While EPA has nearly unfettered discretion to create subcategories as appropriate, the Act provides ample authority for EPA to distinguish among groups of sources within a source category or subcategory in setting a MACT standard. The statute provides that EPA "may distinguish among classes, types and sizes of sources within a category or subcategory" when establishing MACT standards.[42 U.S.C. section 7412(d)(1).] Congress" use of the broad terms "class," "type," and 'size" shows that EPA is intended to have broad discretion in the appropriate factors that warrant distinguishing among sources, and EPA's proposed subcategories fall squarely within the meaning of "types" and 'sizes."

It is a well-established canon of statutory construction that courts "give the words of a statute their ordinary, contemporary, common meaning, absent an indication Congress intended them to bear some different import."70 [Williams v. Taylor, 529 U.S. 420, 431, 120 S.Ct. 1479, 1487-88, 146 L.Ed.2d 435 (2000).] The term "class" is typically defined to mean "a group, set or kind marked by common attributes or a common attribute."[Webster's Third New International Dictionary Unabridged (1993).] "Type" is defined as "qualities common to a number of individuals that serve to distinguish them as an identifiable class or kind,"[Id]. further clarifying that ""[t]ype", "kind" and 'sort" are usually interchangeable" and that ""kind" in most uses is likely to be very indefinite and involve any criterion of classification whatsoever." To the extent that EPA may distinguish among sources within a category or subcategory on the basis of "any [reasonable] criterion of classification whatsoever," and may create subcategories as appropriate, the CAA strongly supports EPA's authority to create subcategories of industrial boilers as proposed.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Jim Griffin
Commenter Affiliation: American Chemistry Council
Document Control Number: EPA-HQ-OAR-2002-0058-2792.1
Comment Excerpt Number: 76

Comment: The legislative history makes clear that Congress intended EPA to distinguish among classes, types and sizes of sources in three circumstances: when differences among sources affect (1) the feasibility of air pollution control technology; (2) the effectiveness of air pollution control technology; and (3) the cost of control.

The Senate Report clarifies that the Administrator should:

...take into account factors such as industrial or commercial category, facility size, type of process and other characteristics of sources which are likely to affect the feasibility and effectiveness of air pollution control technology. Cost and feasibility are factors which may be considered by the Administrator when establishing an emission limitation for a category under section 112. The proper definition of categories, in light of available pollution control technologies, will assure maximum protection of public health and the environment while minimizing costs imposed on the regulated community. However, in limited circumstances where a group of sources may share the characteristics of other sources in the category, the Administrator may establish subcategories for such sources.[S. Rep. No. 228, 101st Cong., 1st Sess. 166].

Thus, in the view of the Senate, the standard for establishing categories and subcategories is essentially the same, although the Administrator is cautioned not to make too rampant use of subcategories.

The House Report similarly provides:

EPA may distinguish among classes, types and sizes of sources within a category or subcategory. . . . In the determination of MACT for new and existing sources,

consideration of cost should be based on an evaluation of the cost of various control options. The Committee expects MACT to be meaningful, so that MACT will require substantial reductions in emissions from uncontrolled levels. However, MACT is not intended to require unsafe control measures, or to drive sources to the brink of shutdown. [House Rep. No. 101-490, Part 1, at 328.]

In sum, while Congress intended the MACT program to achieve significant emissions reductions, it also intended EPA to be cognizant of the costs of control, and to ensure that the program did not cause significant economic hardship. One primary mechanism for achieving this goal is through the use of subcategories, which enables the Agency to account for the fact that distinctions among classes, types and sizes of sources may have a very real impact on the feasibility of a given control technology, the effectiveness of that control technology, and the cost of control.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Jim Griffin
Commenter Affiliation: American Chemistry Council
Document Control Number: EPA-HQ-OAR-2002-0058-2792.1
Comment Excerpt Number: 77

Comment: The only case to interpret the "classes, types and sizes" language supports this interpretation. Sierra Club v. Costle [657 F.2d 298 (D.C. Cir. 1981).] recognized the broad discretion this language confers on EPA to create what in effect are subcategories of sources with differentiated emission standards. This decision interpreted identical statutory language found in the New Source Performance Standards (NSPS) provisions of section 111 of the CAA. Under the "classes, types and sizes" language, the Sierra Club court upheld a variable NSPS SO2 reduction requirement that was tied to a source's existing SO2 emissions levels which, in turn, depended on the sulfur content of the facility's fuel. The court noted that "[t]he required finding that must underlie a variable standard is much broader than a mere determination that uniformity is not achievable. Rather, EPA has the discretion to vary the standard upon finding that such a departure (from uniform control) does not undermine the basic purposes of the Act." [Id. at 321.]

On this basis, the court expressly upheld EPA's subcategorization of coal-fired power plants based on the sulfur content of fuel, finding that "[c]ertainly the text of the statute nowhere forbids a distinction based on sulfur." [Bragdon v. Abbott, 524 U.S. 634, 645 (1998).] More generally, the Sierra Club decision confirms EPA's discretion to set differentiated emissions standards for groups of sources within a category – i.e., for subcategories – even in instances where the strictest standard may be achievable by all sources.

The House Report further provides that "Nothing in this language authorizes the establishment of a category based wholly on economic grounds, nor is there any implication that individual facilities may be granted categorical waivers ... based on assertions of extraordinary economic effect." [id] In other words, the cost of control is an appropriate basis for distinguishing among sources so long as it is not the sole basis for distinction.

The court's analysis in Sierra Club is relevant to an analysis of the authority granted to EPA through CAA section 112. Section 112 employs the same language as Section 111 in defining when EPA may promulgate distinct emission standards for sources within a category or subcategory. The Supreme Court consistently has held that "when administrative and judicial interpretations have settled the meaning of an existing statutory provision, repetition of the same language in a new statute indicates, as a general matter, the intent to incorporate its administrative and judicial interpretations as well." Therefore, section 112, which adopted section 111's terms almost ten years after the D.C. Circuit issued the Sierra Club decision, must be understood to carry the settled meaning given to those terms by that decision.

EPA's past practice has been consistent with this interpretation of the Act. The Agency has subcategorized sources in numerous industrial categories. From this experience, it is possible to distill several principles that have guided the Agency's decision making with regard to creation of subcategories. First, EPA has determined that subcategorization is appropriate where sources use different processes, and those processes result in different types or concentrations of uncontrolled HAPs. Here, for example, the suite of pollutants emitted by solid-fueled boilers differs from that emitted by liquid-fueled boilers, which in turn differs from that emitted by gas-fueled boilers. For example, the types of metals emitted by solid-fueled boilers differ from the types of metals emitted by liquid-fueled boilers, and gas-fueled boilers typically emit little metals, but may emit more organic HAPs. [See 68 Fed. Reg. at 1670 (January 13, 2003).] Thus, subcategorization based on fuel type is appropriate because the different types of boilers emit different types of HAPs.

The Agency also has subcategorized sources based on size, where size differences affect the performance of control technologies, such as where more frequent start up and shut down makes it more difficult for smaller sources to maintain the same level of control as larger sources. That is also the case here. There are fundamental differences in the design of small boilers, as compared to large boilers. Moreover, smaller units often are used in swing load mode, whereas larger units more typically are baseloaded. These smaller boilers have more frequent start ups and shut downs that impact the performance of control technology, and hence the achievability of the standard. Thus, subcategorization of boilers based on size – or infrequent utilization – also is consistent with EPA's past precedent and is appropriate because of the impact of these factors on the ability of these sources to maintain the same level of control as larger sources.

Furthermore, the Agency has subcategorized sources where differences among sources affect the applicability of control technology. For example, EPA created subcategories in the 1999 polyether polyols production MACT standard, finding that "[s]ubcategorization was necessary due to the distinctively different nature of the epoxide and THF processes and its effect on the applicability of controls." [64 Fed. Reg. 29421 (June 1, 1999).] Similarly, in the 1998 flexible polyurethane foam production MACT standard, EPA found that "[s]ubcategorization was necessary to reflect major variations in production methods, and/or HAP emissions that affect the applicability of controls."[61 Fed. Reg. 68407 (December 27, 1996).]
Based on similar rationales, EPA created subcategories in the Group I polymers and resins NESHAP and the primary aluminum production NESHAP, and proposed to create subcategories in the polyurethane foam production NESHAP. [See, e.g., 40 C.F.R. Part 63, Subpart III (Flexible Polyurethane Foam Production), 40 C.F.R. Part 63, Subpart LL (Primary Aluminum Reduction Plants), and 40 C.F.R. Part 63, Subpart U (Group I Polymers and Resins).] Here, for example, fabric filters may be an appropriate control technology to capture metals from coal-fired boilers, but are not appropriate for use on oil-fired boilers because the soot blinds the bags of the fabric filter, and is also a fire hazard. Thus, subcategorization based on fuel type is appropriate because the type of fuel affects the applicability of control technology.

In sum, the use of subcategorization in this rule is amply supported by the language of the statute, the legislative history, applicable case law, and the Agency's own past practices. With these principles in mind, we believe that further subcategorization is warranted.

Response: See response to comment EPA-HQ-OAR-2002-0058-3213.1, excerpt 145 for EPA's authority to create subcategories.

Commenter Name: Jim Griffin
Commenter Affiliation: American Chemistry Council
Document Control Number: EPA-HQ-OAR-2002-0058-2792.1
Comment Excerpt Number: 81

Comment: EPA needs to establish a subcategory for "limited use" units. While the prior Boiler MACT rule treated units with average capacity factors of 10% or less separately, the proposed rule does not continue that approach.

Instead, EPA presumes that limited use units are just like those operated full-time which burn a similar fuel. Limited use sources operate intermittently and for shorter periods of time (e.g., small package boilers that are only used during plant outages, a backup boiler that runs when other units are being fixed, a peaking unit used to supplement electric generation during particularly hot summer days, a process heater that operates for a few hours at a time to warm up a heat transfer fluid for use in a chemical process, or a process heater that only operates intermittently in order to maintain the temperature of a process fluid in the desired range).

Compared to most boilers and process heaters, these units spend a far greater percentage of their time starting up and shutting down. As a result, their emissions profiles differ from sources

EPA United States Environmental Protection Agency

Summary of Public Comments and Responses for

National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

Final rule; notice of final action on reconsideration.

E.O. 12866 NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters 2060-AR13 Final Rule 20120822

December 2012

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U. S. Environmental Protection Agency

Office of Quality Performance Standards

Sector Policies and Program Division

Energy Strategies Group (D243-01)

Research Triangle Park, NC

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102H. HCl as a Surrogate for Acid Gases [DENIED PETITIONER ISSUE]

Commenter Name: James Pew
Commenter Affiliation: Earthjustice, Clean Air Council, Partnership for Policy Integrity
Document Control Number: EPA-HQ-OAR-2002-0058-3511-A1
Comment Excerpt Number: 11

Comment: EPA proffered a new rationale for its use of hydrochloric acid as a surrogate for all acid gases: "it is highly likely that facilities will choose to control these acid gases by applying the same technology and the means for removal of each are similar." Resp. to Comments Vol. 2 (3187.1 Excerpt 12). EPA's new rationale is irrelevant under the well-established test for whether a surrogate is valid. It does not, for example, address HCN's variable relationship to HCl. *See* Comments at 13. Nor has the Agency demonstrated that add-on controls (rather than fuel-substitution or other methods) are the only means of removing all acid gases; as set forth in our comments, fuel choice can effectively reduce acid gas emissions.

Response: This comment relates to a petition that was denied by the EPA. Refer to the preamble section 'Other Actions We Are Taking' for the reasons for the denial.

Rationale for Subcategories

7A. Limited-Use Units

Commenter Name: Chris M. Hobson
Commenter Affiliation: Southern Company
Document Control Number: EPA-HQ-OAR-2002-0058-3520-A1
Comment Excerpt Number: 4

Comment: The use of a capacity factor is consistent with other regulations and requirements. Although some limited use boilers may choose to take a limit based on hours of operation for ease of monitoring, it makes more sense for many boilers to monitor their capacity factor on a heat input basis. In many cases, monitoring heat input (fuel use) is something the units are already required to do for other regulations, such as New

Source Performance Standard (NSPS) subparts Db and Dc. For example, Georgia Power's Plant McDonough combined-cycle facility, currently under construction, includes two auxiliary boilers that are permitted to operate up to a 10% capacity factor on a heat input basis. This capacity factor permit limit is directly used to determine the applicability of NSPS emission limits for PM, NOx, and SO2. Therefore, the capacity factor applicability for a limited use subcategory would be consistent with the applicability for NSPS at many facilities.

Response: The EPA agrees with the commenter, and the definition of the limited use subcategory has been revised in the final rule to be based on a 10 percent capacity factor. The annual operating hour threshold has been removed.

Cogentrix units exhibit vastly differing emissions profiles than other similarly-designed boilers or process heaters in the industrial, commercial, and institutional source category solely because they produce electricity. There are many other boilers included within the source category that are producing electricity.

7C01. New Biomass Subcategories (General Comments)

Commenter Name: James Pew
Commenter Affiliation: Earthjustice, Clean Air Council, Partnership for Policy Integrity
Document Control Number: EPA-HQ-OAR-2002-0058-3511-A1
Comment Excerpt Number: 70

Comment: EPA has decided to designate any major source that burns at least 10% biomass as a biomass burner (pages 80601 and 80655 of the major source rule). This means that a facility burning 90% coal and 10% biomass would be held to the less rigorous PM emission standard for biomass than for coal. This is arbitrary. At a minimum, the rule should make basic sense. This does not pass that test. [See Submittal for table comparing coal and biomass limits.]

Response: Several comments were received on initial June 4, 2010 proposal with respect to how combination fuel units should be classified. The EPA presented its rationale in its response to comments on the appropriate fuel use threshold of combination boilers (see 76 FR 15635). EPA did not propose to revise this rationale in this reconsideration action and maintained a consistent cutoff of 10% biomass to determine the appropriate subcategory assignment in this final amendments. The EPA was not petitioned for reconsideration on this topic and it did not re-open the fuel threshold level for subcategory determination in this final notice therefore this comment is outside the scope of this reconsideration action.

Commenter Name: Michael Livermore, Jason Schwartz
Commenter Affiliation: Institute for Policy Integrity, NYU School of Law
Document Control Number: EPA-HQ-OAR-2002-0058-3432-A1
Comment Excerpt Number: 2

Comment: EPA should explore the justifications for subcategorization for new sources separately. Compared to existing sources, new sources do not face the same limitations on their design options. EPA must explain why for new, still-unconstructed sources, it would not be more efficient to set a single standard and let all new sources choose any fuel type and design option capable of meeting that standard.

Response: The EPA disagrees that a single standard for all new sources is justified. Emissions of CO, PM, and metallic HAP vary greatly with the design of the combustion unit; the same lot of fuel could exhibit a vastly different emission profile between different combustor designs. Additionally, sources may be limited in their subcategorization choices due to the geographic availability of some fuels and their energy requirements. These conditions may limit or dictate what design type of coal or biomass boilers can be installed. The design types currently being used were installed for specific reasons which may be just as applicable for future installations. For these reasons, the EPA believes that separate emission limitations are justified for all of the combustor-based subcategories.

Commenter Name: James Pew
Commenter Affiliation: Earthjustice, Clean Air Council, Partnership for Policy Integrity
Document Control Number: EPA-HQ-OAR-2002-0058-3511-A1
Comment Excerpt Number: 4

Comment: EPA's subcategories for new units are, if possible, even more unlawful and irrational. Nowhere does the agency explain why it wishes to encourage the construction of obsolete boilers that, according the agency at least, emit far more pollution than other boilers. It is entirely possible for a company that wishes to build a new boiler to build one that is clean. Assuming *arguendo* that the boiler designs on which EPA has seized as an excuse for setting different standards for existing boilers truly do affect emissions in a meaningful way, then they are also necessarily a means by which pollution can be controlled. Accordingly, EPA should set new source standards based on sources that have the lowest emissions as a result of their cleaner design as well as of the other factors that affect their emission levels.

Response: The commenter disagrees with the EPA's subcategories for new sources, but does not provide any explanation or analysis to support its assertion that the subcategories are "unlawful and irrational." As noted elsewhere in the record for today's action, section 112 provides EPA with broad discretion to subcategorize among sources in a source category. Under the commenter's approach, EPA would likely never be able to exercise this authority, since some types sources will generally always be lower-emitting than others. Given that Congress used such broad language when authorizing EPA to create subcategories, it is unlikely that such a result is what it intended. Moreover, as explained elsewhere in the record for today's action, the EPA has established emissions standards for new sources based on the best-performing similar source, as required by section 112(d). Therefore, the EPA's standards are in fact based on sources with the lowest emissions levels, consistent with the requirements of the Act.

As indicated in the response to comment EPA-HQ-OAR-2002-0058-3432-A1, excerpt 2, the type of boilers selected for installation in the future is based on several factors including fuel availability and the facilities' energy demands. For example, a facility planning on a new coal boilers may select a pulverized coal unit because it requires a high steam production which a stoker would not provide, or it may select a fluidized bed coal unit if the fuel is of low quality. The same is true for biomass, certain types of biomass can only be combusted in a certain type of boiler designed to combust that type of biomass. In either case, the final rule has a single emission limitation for mercury and HCl for all solid fuel subcategories, and a single PM emission limitation for the 3 coal subcategories. In addition, any new boiler (above 30 MMBtu/hr) will be subject to an NSPS (subpart Db for units greater than 100 MMBtu/hr, subpart Dc for boiler 30 to 100 MMBtu/hr.) which regulate PM, SO_2 and NO_x emissions which will also factor into what boiler type a facility will elect to install for future energy needs.

Commenter Name: James Pew
Commenter Affiliation: Earthjustice, Clean Air Council, Partnership for Policy Integrity
Document Control Number: EPA-HQ-OAR-2002-0058-3511-A1
Comment Excerpt Number: 71

Comment: Sub-classifications do not correspond to the population of burners now being permitted EPA has designated still more sub-classifications of biomass boiler type than it had before. Our permit database indicates that new boilers now being permitted around the country do not fall under the categories of biomass boiler that EPA designates. Almost all are either stokers or fluidized bed boilers. We have never seen a permit for a new "dutch oven" or "biomass fuel cell". EPA's ever- growing number of categories corresponds to a shrinking population of burners in each category, rendering the MACT floors meaningless. The floors set in subclassifications do not reflect generally achievable rates, as illustrated above.

Response: The EPA acknowledges that the majority of new units designed to combust biomass fuels are projected to be stokers or fluidized bed units. The EPA disagrees that subcategorization outside of stokers and fluidized bed units is unjustified. Regardless of new unit construction, there are many Dutch Ovens (22) and fuel cells (29) combusting biomass fuels that are currently in operation in the United States with the latest one (FC) being installed in 2006. In any energy application, the boiler is designed to make the best use of temperature, turbulence, and time (the three "T" of combustion). All three of these aspects relate directly to the properties of the fuel to be used (moisture content, particle size, ash content, and heat value). For example, Dutch ovens find application where the anticipated wood fuel has a high (up to 60 percent) moisture content. Further, the EPA continues to believe that the subcategories for new and existing units should be identical because of the fact that a reconstructed existing unit will be subject to the same emission limitations as a newly constructed boiler. If the Dutch Oven and Fuel Cell subcategories are eliminated for new sources, they would also be removed for existing sources; this would potentially place units currently in operation into subcategories for which their combustion characteristics and emissions profiles are vastly different.

Commenter Name: Mark Weiss
Commenter Affiliation: Reciprocal Energy Company
Document Control Number: EPA-HQ-OAR-2002-0058-3658-A2
Comment Excerpt Number: 9

Comment: The EPA should consider further separation of Suspension Combustion sub-categories:

Biomass Suspension Combustion:

1. With unsupported flames.

2. Load following thermal applications with more then 40% of run time at less then 75% capacity

3. With powdered fuel that is site milled. This would separate "dust burning" technology from technology designed to run with high efficiency, standard boilers without significant bottom ash. This is a significant issue, as hammer-mill technology cannot economically produce powder that is fine enough to reduce CO levels at or near the proposed 58 PPM.

New data should be collected within these categories. The 3-hour test should be modified to more correctly measure the operation of the boiler at 50% or 60% fire rates. A properly tuned suspension combustion system can combust more then +99.5% of the fuel and boiler efficiency can exceed 84%. Load following applications reduce fuel consumption and overall plant emissions but can result in higher, short term CO levels.

Response: The EPA disagrees that further subcategorization is necessary for Suspension Burners. The EPA acknowledges that units which combust biomass fuel in suspension have different combustion characteristics and emissions profiles than other combustor designs (e.g., Stokers). The EPA does have data to determine if the differences in combustion styles result in different emission profiles between the three specified subcategories of suspension burners to warrant further subcategorization. The commenter also did not provide data to support the comment.

Commenter Name: M.L. Steele
Commenter Affiliation: CraftMaster Manufacturing, Inc.
Document Control Number: EPA-HQ-OAR-2002-0058-3814-A1
Comment Excerpt Number: 3

Comment: Biomass Subcategory assignment method. We have learned from previous comments and responses (see Document Control Number EPA-OAR-0058-1907.1, Comment Excerpt #3) that USEPA had assigned the biomass-fired boiler and process heater units to their respective combustor design subcategories using the procedure outlined in USEPA's memo "Revised Development of Baseline Emissions Factors for Boilers and Process Heaters at Commercial, Industrial, and Institutional Facilities", January, 2011. *For units employing more than one biomass combustor design,* the procedure established a hierarchy to assign the unit to a single subcategory. The hierarchy was, 1) Fluidized Bed, 2) Stokers, 3) Dutch Oven/ Suspension Burners, 4) Suspension/ Grate, and 5) Fuel Cells. Then, under the hierarchy approach, if a biomass boiler could have been fired using a combination of "Air-Swept Stokers" and "Suspension Burners", the boiler was assigned to the "Stoker" subcategory.

If the hierarchy is still in use (albeit modified to accommodate the changes to the biomass subcategories found in the current proposed rules), we must confirm CraftMaster's earlier objection because we believe the hierarchy approach is arbitrary and an inappropriate method of assigning units to a subcategory. This concern applies to units that make up the MACT Floors and for classification of units for ongoing compliance purposes. The assignment should be based on a meaningful parameter, the heat input from each combustor design. For the MACT Floor units, the subcategory assignment should be based on the fuel *and combustor design* that provided 90% or more of boiler heat input during the stack test. For compliance purposes, the applicable subcategory (and limits) should be determined based on the combustor design that provided the majority of the heat input over the last twelve consecutive month period.

Response: The EPA is maintaining the approach as described in the memorandum "Revised Development of Baseline Emissions Factors for Boilers and Process Heaters at Commercial, Industrial, and Institutional Facilities", November 2011. The Clean Air Act does not require that the EPA establish subcategories within a source category, but rather provides discretion to do so based on class, type, or size. The EPA believes the approach described in the memorandum referenced above represents a reasonable subcategory assignment given the data available to the EPA at the time of this rulemaking. The ICR survey data did not contain information on heat input provided to each specific type of combustor, and thus there was no way to distribute the database according to the methods described by the commenter. The EPA has worked to correct the subcategory assignments of several units in the inventory based on public comments and when specific examples of multiple combustor units were provided to the EPA to indicate that the majority heat input was provided by a certain type of combustor, the unit's classification was changed to reflect the combustor design most representative of the unit.

Commenter Name: M.L. Steele
Commenter Affiliation: CraftMaster Manufacturing, Inc.
Document Control Number: EPA-HQ-OAR-2002-0058-3814-A1
Comment Excerpt Number: 4

Comment: We acknowledge that in the current proposed rules USEPA has considered for those units in the CO and PM MACT Floors that they must be ≥ 90% biomass-fired during the stack testing to be considered in the Floor. However this should be taken one step further to ≥ 90% biomass-fired *and fired by the combustor design for the applicable subcategory.* To do otherwise could introduce data that is not representative of the subcategory due to a co-firing situation similar to that noted in the PM MACT Floor study for biomass suspension-fired units where units co-fired with natural gas were removed from the MACT Floor.

Response: See the response to comment EPA-HQ-OAR-2002-0058-3814-A1, excerpt 3.

Commenter Name: M.L. Steele
Commenter Affiliation: CraftMaster Manufacturing, Inc.
Document Control Number: EPA-HQ-OAR-2002-0058-3814-A1
Comment Excerpt Number: 5

Comment: With respect to guidance in classifying a unit employing more than one biomass combustor design for compliance purposes, the proposed regulations are silent.

It is not known how many sources are not properly classified in the MACT Floors as a result of the hierarchy, however, many boilers do utilize multiple combustor designs. For compliance purposes it is essential that each biomass unit be assigned to its proper combustor-design subcategory and not arbitrarily assigned to the "Stoker/ sloped grate/ other firing wet biomass" subcategory.

Response: For compliance purposes, it is the source that submit the Initial Notification of Applicability in which the source would identify the affected units and their subcategory. The regulatory agency would only assigned the subcategory if the source requested an Applicability Determination. The regulatory agency would make the determination based on data and information supplied by the source.

Commenter Name: Randall D. Quintrell
Commenter Affiliation: Georgia Paper & Forest Products Association
Document Control Number: EPA-HQ-OAR-2002-0058-3451-A1
Comment Excerpt Number: 18

Comment: We support the separate CO subcategorizes for biomass boilers, recognizing the significant design differences based on boiler type and fuel type.

Response: The EPA thanks the commenter for their support.

Commenter Name: Holly R. Hart
Commenter Affiliation: United Steel Workers (USW)
Document Control Number: EPA-HQ-OAR-2002-0058-3498-A1
Comment Excerpt Number: 2

Comment: USW supports EPA's proposal to define with respect to the combustion-based pollutants any boiler that burns 10% or more biomass as a biomass boiler. The unique emissions characteristics of biomass boilers are such that if this had not been done, the regulation would have rendered most mixed-fuel boilers non-viable and worked to discourage operators that might have considered mixing renewable biomass with fossil fuel.

Response: The EPA thanks the commenter for their support.

Commenter Name: Holly R. Hart
Commenter Affiliation: United Steel Workers (USW)
Document Control Number: EPA-HQ-OAR-2002-0058-3498-A1
Comment Excerpt Number: 3

Comment: USW supports EPA's decision as described at pages 80607-8 to create additional biomass and solid fuel subcategories to adequately reflect the many different types of such equipment used by industry and the different emissions characteristics of this variety of equipment. Doing so will allow for realistic emissions limits for operators of such boilers.

Response: The EPA thanks the commenter for their support.

Commenter Name: Michael L. Krancer
Commenter Affiliation: Pennsylvania Department of Environmental Protection (DEP)
Document Control Number: EPA-HQ-OAR-2002-0058-3507-A1
Comment Excerpt Number: 6

Comment: In the final rule, the EPA added subcategories for hybrid suspension/grate biomass units, limited use units, solid fuel units, and non-continental liquid units. The EPA also added a fuel specification to the final rule that would allow units combusting gases not defined as "Gas 1" gases to qualify as Gas 1 units by demonstrating that the fuels combusted meet a fuel specification. In the reconsidered rule, the EPA added additional subcategories for units designed to burn heavy liquids, units designed to burn light liquids, biomass dry stokers, biomass hybrid suspension/grate boilers and biomass pile burners/dutch ovens.

The DEP believes that it is appropriate to add new subcategories due to the unique design of these units. Therefore, the DEP agrees with the EPA's proposal to add new subcategories.

Response: The EPA thanks the commenter for their support.

Commenter Name: Heather Parent
Commenter Affiliation: Maine Department of Environmental Protection
Document Control Number: EPA-HQ-OAR-2002-0058-3691-A2
Comment Excerpt Number: 3

Comment: Maine DEP supports the addition of subcategories for biomass units based on the type of unit and the type of biomass combusted.

Response: The EPA thanks the commenter for their support.

7C02. Biomass: Kiln-Dry Stoker/Sloped Grate/Other

Commenter Name: Bill Lane
Commenter Affiliation: American Home Furnishings Alliance (AHFA)
Document Control Number: EPA-HQ-OAR-2002-0058-3676-A2
Comment Excerpt Number: 5

Comment: We noted that the Preamble to the Proposed Reconsideration Rule has a typo. In its discussion of fuel in the dry biomass subcategory at Section V.C.5.b (76 Fed. Reg. at 80608), EPA refers to biomass fuel with a moisture content of "less than 2 percent." This should be corrected to "20 percent."

Response: The EPA thanks the commenter for identifying this typographical error. Discussion of biomass moisture content was correct in the proposed rule language and a description of the final subcategories in the final preamble will reflect the appropriate moisture content.

Commenter Name: Philip Lewis
Commenter Affiliation: Michigan Biomass - Grayling Generating Station
Document Control Number: EPA-HQ-OAR-2002-0058-3815-A1
Comment Excerpt Number: 2

Comment: A separate category for biomass distinguishes between boilers that use dry wood vs. wet wood. The carbon monoxide (CO) emissions in particular are so divergent for the fuels that driving biomass boilers to CO levels achieved with dry wood was not achievable without threatening the viability of our operations.

Response: The EPA has revised its CO MACT floor emission limitations for all subcategories since the December, 2011 proposed reconsideration of the rule. Based on new data received, corrections to old data, and inventory changes and using the same MACT floor methodology, the revised CO limit for Stokers/Sloped Grate/Other units combusting kiln-dried biomass fuel in the final rule is 460 ppm corrected to 3 percent oxygen.

Commenter Name: Gary Melow, Director
Commenter Affiliation: Michigan Biomass (MB)

Document Control Number: EPA-HQ-OAR-2002-0058-3478-A1
Comment Excerpt Number: 2

Comment: We strongly support a separate category for biomass distinguishes between boilers that use dry wood vs. wet wood. The carbon monoxide (CO) emissions in particular are so divergent for the fuels that driving biomass boilers to CO levels achieved with dry wood was not achievable without threatening the viability of our operations.

Response: The EPA thanks the commenter for their support.

Commenter Name: Bart Sponsellar
Commenter Affiliation: Wisconsin Department of Natural Resources
Document Control Number: EPA-HQ-OAR-2002-0058-3527-A2
Comment Excerpt Number: 9

Comment: The EPA is proposing carbon monoxide (CO) and particulate (PM) emission limitations for kiln-dried wood boilers (biomass dry stokers) and hybrid suspension grate boilers. This approach by default adjusts the emission limitations for biomass subcategories which previously included these boilers. The Department supports EPA's proposal to more specifically apply emission limitations for CO and PM to each biomass boiler type. However, the Department does have a preferred approach as discussed below. The Department supports EPA's approach because the emission levels of these pollutants are specific to the subcategory sources: CO based on combustion configuration for each boiler type and metals (PM surrogate) based on metal content of the site specific biomass along with the particulate control device. In this latter case, the metals content of kiln-dried biomass is likely very low compared to biomass exposed to the environment. In considering this further, metals content between biomass types will also vary with the length of time it is exposed to the environment. For example, metals accumulating through deposition will be found in increased amounts on tree bark versus on crops harvested annually such as sugar cane. Similar, trends are likely seen for metals taken up from soils – the older biomass may have increased concentrations.

Response: The EPA thanks the commenter for their support.

Commenter Name: Stuart A. Clark
Commenter Affiliation: State of Washington Department of Ecology
Document Control Number: EPA-HQ-OAR-2002-0058-3665-A2
Comment Excerpt Number: 1

Comment: We are pleased that EPA segregated biomass boilers by design type under the Major Source Boiler MACT Rule. This segregation better reflects the capabilities of the various boiler designs. The clear separation of biomass from coal units has provided particulate emission limits that better reflect the capabilities of units burning coal and biomass.

Response: The EPA thanks the commenter for their support.

Commenter Name: Bill Lane
Commenter Affiliation: American Home Furnishings Alliance (AHFA)

Document Control Number: EPA-HQ-OAR-2002-0058-3676-A2
Comment Excerpt Number: 1

Comment: AHFA strongly supports EPA's proposal to establish a new subcategory for units designed to burn kiln-dried biomass. For nearly a century, the wood furniture manufacturing industry has used kiln-dried wood containing less than 20% moisture to generate heat and steam. By combusting kiln-dried biomass in steam-generating boilers, the wood furniture industry avoids the need to rely upon fossil fuels (coal, oil, or gas) for process and domestic heating purposes. By minimizing fossil fuel consumption, our industry has been avoiding a potentially significant source of greenhouse gas emissions for over a century. Our use of this biomass energy resource is consistent with sustainable business practices and EPA goals for reducing emissions of greenhouse gases. Combustion of clean "off-fall" from the furniture manufacturing process for energy recovery purposes also avoids the disposal of this valuable material in landfills.

Due to the unique characteristics of kiln-dried wood, our industry boilers have been sized differently and designed differently to maximize efficiency for the combustion of dry biomass. In addition, our fuel feed systems are uniquely developed for dry storage and handling of wood off-fall. It is clearly appropriate for EPA to designate a new subcategory for this discrete group of boilers.

Response: The EPA thanks the commenter for their support.

Commenter Name: Michael Cassidy
Commenter Affiliation: Kohler Co.
Document Control Number: EPA-HQ-OAR-2002-0058-3803-A1
Comment Excerpt Number: 2

Comment: Kohler Co. agrees with and supports EPA's proposed expansion of boiler/process heater subcategories, especially the inclusion of the kiln dried biomass subcategory.

Response: The EPA thanks the commenter for their support.

Commenter Name: Arthur N. Marin
Commenter Affiliation: Northeast States for Coordinated Air Use Management (NESCAUM)
Document Control Number: EPA-HQ-OAR-2002-0058-3506-A1
Comment Excerpt Number: 14

Comment: Another example of inappropriate parsing of emissions data is the creation of wet and dry biomass fuel subcategories. In principle, NESCAUM does support having separate categories for wet and dry biomass fuel, because different moisture content in biomass fuel changes the CO emission profile of the fuel considerably. With proper emission control technologies installed, both wet and dry stokers units should be able to achieve large PM emission reductions. By creating subcategories for industries in which sources use kiln dried biomass fuel and have not installed adequate controls, the EPA is missing an opportunity to better control these sources.

Response: The EPA disagrees with the commenter's assertion that subcategorization into wet and dry biomass is unnecessary. Under CAA section 112(d)(1), the Administrator has the discretion to distinguish among classes, types, and sizes of sources within a category or subcategory in establishing standards. The EPA maintains that, normally, any basis for subcategorization (*i.e.*, class, type, or size) must be related to an effect on HAP emissions that is due to the difference in class, type, or size of the units. The commenter itself states that there are differences between wet and dry biomass. Facilities which combust kiln-dried biomass (i.e., lumber) fuel are carefully integrated to utilize their available resources, and the combustion units are sized to efficiently combust biomass that has undergone a drying process. This drying process enhances the combustion quality of the fuel. The facilities monitor and maintain specific moisture levels in the fuel, typically to less than 2 percent. The differences between virgin biomass (timber/Green wood) and kiln-dried biomass warrant differing combustion styles and parameters for each fuel type, for which EPA believes subcategorization is justified.

Commenter Name: Paul Noe
Commenter Affiliation: American Forest & Paper Association (AF&PA) et al.
Document Control Number: EPA-HQ-OAR-2002-0058-3521-A1
Comment Excerpt Number: 62

Comment: Biomass Dry Stoker/Sloped Grate/Other. Stoker/sloped grate/other unit designed to burn dry biomass means the unit is in the units designed to burn biomass/bio-based solid subcategory that is either a stoker, sloped grate, or other combustor design and is not in the stoker/sloped grate/other units designed to burn wet biomass subcategory. The dry biomass stoker/sloped grate/other unit subcategory should not be limited to kiln-dried biomass, as there are other types of dry biomass, such as wood dried at plywood and other composite wood products manufacturing facilities in dryers.

Response: The subcategory is not limited to only kiln-dried biomass even thought the subcategory is titled as such. As defined in the rule, combustion units designed to burn biomass or bio-based solid fuels may qualify for the Stoker/Sloped Grate/Other unit designed to burn kiln-dried biomass if the unit is either a stoker, sloped grate, or other combustor design and the moisture content of the biomass combusted is less than 20 percent on an annual heat input basis.

7C03. Biomass: Hybrid Suspension/Grate

Commenter Name: David A. Buff, Golder Associates Inc.
Commenter Affiliation: Florida Sugar Industry (FSI)
Document Control Number: EPA-HQ-OAR-2002-0058-3504-A1
Comment Excerpt Number: 8

Comment: The FSI agrees that it is appropriate and necessary for EPA to (a) establish a separate subcategory for hybrid suspension grate boilers designed to combust bagasse and (b) establish corresponding emission limits for PM, TSM, and carbon monoxide ("CO") that are based solely on the performance of the hybrid suspension grate boilers in this subcategory. The FSI's rationale for requesting this subcategory is summarized in the FSI's petition for reconsideration, which was filed with EPA on May 12, 2011. The FSI's petition for reconsideration demonstrates that a hybrid suspension grate boiler fired with bagasse faces unique challenges that directly affect the boiler's emissions. The unique features of these boilers and their emission profiles warrant a separate subcategory and separate emission limits for PM, TSM, and CO.

Response: The EPA thanks the commenter for their support.

Commenter Name: David A. Buff, Golder Associates Inc.
Commenter Affiliation: Florida Sugar Industry (FSI)
Document Control Number: EPA-HQ-OAR-2002-0058-3504-A1
Comment Excerpt Number: 6

Comment: The FSI agrees with and strongly supports EPA's decision to create additional subcategories for solid fuels, including a subcategory for hybrid suspension grate boilers.

Response: The EPA thanks the commenter for their support.

Commenter Name: Paul Noe
Commenter Affiliation: American Forest & Paper Association (AF&PA) et al.
Document Control Number: EPA-HQ-OAR-2002-0058-3521-A1
Comment Excerpt Number: 64

Comment: Biomass Hybrid Suspension Grate. Hybrid suspension grate boiler means a boiler designed with air distributors to spread the fuel material over the entire width and depth of the boiler combustion zone. The biomass fuel combusted in these units exceeds a moisture content of 40 percent (annual average) on an as-fired basis. The drying and much of the combustion of the fuel takes place in suspension, and the combustion is completed on the grate or floor of the boiler. Fluidized bed, dutch oven, and pile burner designs are not part of the hybrid suspension grate boiler design category. We also request that the 40 percent fuel moisture content cutoff in the hybrid suspension grate subcategory specify that it is for biomass and that it is on an annual average basis in order to acknowledge the variability in biomass moisture content.

Response: The EPA thanks the commenter for their recommended revisions to the definition of the Hybrid Suspenion/Grate subcategory. We agree that it is appropriate to define the moisture specification on an annual heat input basis rather than on an as-fired basis due to the inherent variability(i.e., annual basis) of the moisture content and to be consistent with the criteria listed for determining applicability of other subcategories. The specified revisions have been made to the definition in the rule.

Commenter Name: Robert D. Bessette
Commenter Affiliation: Council of Industrial Boiler Owners (CIBO)
Document Control Number: EPA-HQ-OAR-2002-0058-3534-A1
Comment Excerpt Number: 7

Comment: In its Petition for Reconsideration, CIBO requested that the definition of a 'suspension/grate' boiler specifically include the words 'spreader stoker' as a type of combustion system in a suspension/grate boiler in addition to those with independent suspension burners.

The Proposed Reconsideration Rule states that "Stoker means a unit consisting of a mechanically operated fuel feeding mechanism, a stationary or moving grate to support the burning of fuel and admit under-grate air to the fuel, an overfire air system to complete combustion, and an ash discharge system. This definition of stoker includes air swept stokers. There are two general types of stokers: underfeed and overfeed. Overfeed stokers include mass feed and spreader stokers. Fluidized bed, dutch oven, pile burner, hybrid suspension grate, suspension burners, and fuel cells are not considered to be a stoker design." 76 Fed. Reg. 80,655.

The Proposed Reconsideration Rule also indicates that EPA agrees that "dutch ovens and pile burners should be included in the same subcategory and suspension burners should be a separate subcategory. Therefore, the EPA is proposing separate emission limits for the combustion-based pollutants for these subcategories." 76 Fed. Reg. 80609.

The Proposed Reconsideration Rule revised the definition of "hybrid suspension grate boiler" to include the italicized sentence:

a boiler designed with air distributors to spread the fuel material over the entire width and depth of the boiler combustion zone. *The fuel combusted in these units exceed a moisturecontent of 40 percent on an as-fired basis.* The drying and much of the combustion of the fuel takes place in suspension, and the combustion is completed on the grate or floor of the boiler. Fluidized bed, dutch oven, and pile burner designs are not part of the hybrid suspension grate boiler design category.

76 Fed. Reg. 80,652. This revision assists in better defining the source. CIBO recommends that the definition further specify that the moisture content be 40 percent on average, as the precise moisture content will fluctuate somewhat over time. CIBO suggests the addition in red below to the text:

The fuel combusted in these units exceed an average annual moisture content of 40percent on an as-fired basis.

Response: For a response to the request for the moisture content in the definition of Hybrid Suspension Grate Boiler to be on an annual average basis, please see comment EPA-HQ-OAR-2002-0058-3251-A1, excerpt 64.

7C04. Biomass: Suspension burner

Commenter Name: Mark Weiss
Commenter Affiliation: Reciprocal Energy Company
Document Control Number: EPA-HQ-OAR-2002-0058-3658-A2
Comment Excerpt Number: 1

Comment: While we appreciate the changes reflected in the March 21st Rule Publication, we do not believe that the EPA has considered all of the relevant information pertaining to suspension combustion technology. We agree that suspension combustion should be treated within distinct biomass categories. The new, single, category is however too broad to accommodate significant variations within the suspension combustion field.

Response: The EPA disagrees that the single Suspension Burner subcategory is too broad. The commenter provided no information or data to support this assertion. The EPA does not believe that any significant variations within the Suspension Burner subcategory result in vastly different emission profiles.

Commenter Name: Mark Weiss
Commenter Affiliation: Reciprocal Energy Company
Document Control Number: EPA-HQ-OAR-2002-0058-3658-A2
Comment Excerpt Number: 4

Comment: The biomass fuel used in suspension combustion varies greatly by species and combustion particle size. No allowance is made for these variations yet they are primarily determinate of CO levels.

Response: For response to the claim that the single Suspension Burner subcategory is too broad, please see comment EPA-HQ-OAR-2002-0058-3658-A2, excerpt 1.

Commenter Name: M.L. Steele
Commenter Affiliation: CraftMaster Manufacturing, Inc.
Document Control Number: EPA-HQ-OAR-2002-0058-3814-A1
Comment Excerpt Number: 1

Comment: The "Suspension Burners" subcategory should include those units firing fine, dry, biomass particles in suspension that are conveyed in an airstream to the furnace like pulverized coal. This firing method. is described as "True Suspension" on page 15634 of the preamble to the March 21, 2011 final rules. The definition of "Suspension burner" instead describes "fuel distributors" and "injecting air at the point where the fuel is introduced ... in order to spread the fuel material over the boiler width." Also, the biomass fuel is described as "the wet fuel". These terms describe the "Air-swept Stoker". Then the current definition does not clearly include the True Suspension-fired units in the "Suspension Burner" subcategory and should be revised. The requested clarification would make the definition consistent with all the units evaluated by USEPA in the CO and PM MACT Floors. All "Suspension Burner" units are noted in the database as firing dry biomass.

Response: We agree with the commenter that the units evaluated in the MACT floor analysis for this final rule include "True Suspension" boilers as noted by the commenter and that these units are firing dry biomass materials. The references to the wet fuels and air-swept stoker fuel injection mechanisms were inadvertantly left in the definition from the June 4, 2010 proposal. At that time, the suspension burner group included both these "True Suspension" units as well as hybrid suspension grate units. Since that proposal the hybrid suspension grate units now belong to a separate subcategory due to fundamental differences in their design. The EPA has revised the definition of suspension burner in the final rule to be consistent with the types of units it included in the data analysis for this subcategory.

7C05. Biomass: Dutch Oven/Pile Burner

Commenter Name: Paul Noe
Commenter Affiliation: American Forest & Paper Association (AF&PA) et al.
Document Control Number: EPA-HQ-OAR-2002-0058-3521-A1
Comment Excerpt Number: 61

Comment: Within the biomass subcategory, EPA is proposing different CO and PM limits for several boiler types – wet stoker, dry stoker, fluidized bed, fuel cell, and Dutch oven, suspension burner, and hybrid suspension grate units – due to design differences among these types of units. We agree with EPA's decision to split Dutch ovens and suspension burners for regulation of CO emissions in the proposed rule. Dutch ovens and suspension burners are fundamentally different in design and fuel firing capabilities. Dutch ovens have two chambers. Solid fuel is dropped down into a refractory-lined chamber where drying and gasification take place in the fuel pile. Gases pass over a wall into the second chamber where combustion is completed. Dutch ovens are capable of burning high moisture fuels such as bark, but have low thermal efficiency and are unable to respond rapidly to changes in steam demand. Suspension burners combust fine, dry fuels such as sawdust and sanderdust in suspension. Rapid changes in combustion rate are possible with this firing method. They can be of watertube or firetube design, and may be package units or field-erected. It is not appropriate to combine these two types of boilers for CO standards given their very different characteristics.

Response: The EPA thanks the commenter for their support.

Commenter Name: M.L. Steele
Commenter Affiliation: CraftMaster Manufacturing, Inc.
Document Control Number: EPA-HQ-OAR-2002-0058-3814-A1
Comment Excerpt Number: 2

Comment: We question the need for separate subcategories for the Dutch Oven and Fuel Cell combustors. Wellons units are described as Fuel Cells in the literature but are found in the CO MACT Floor evaluations under Dutch Ovens as well as Fuel Cells. Konus units, another pile burner design, are listed in the Fuel Cell subcategory also. Interestingly Konus units also appear in the Stoker/ sloped grate/ other subcategory. These should be evaluated for a possible change in subcategorization.

Response: We disagree with the suggestion that there should be a single subcategory for Dutch Ovens and Fuel Cell combustors. Under CAA section 112(d)(1), the Administrator has the discretion to distinguish among classes, types, and sizes of sources within a category or subcategory in establishing standards. The EPA maintains that, normally, any basis for subcategorization (*i.e.*, class, type, or size) must be related to an effect on HAP emissions that is due to the difference in class, type, or size of the units. Based on the HAP emission data we have on these units, it is appropriate to have separate subcategories for these units. As part of the reconsideration process, we have redone the MACT floor analysis based on new data, corrected data, and changes in inventory. Several facilities which operate combustion units in one of these subcategories submitted comments specifying that their combustion units should be reclassified into another combustor design subcategory. The EPA accepted the comments from these facilities and processed the combustor design changes in the EPA ICR Databases.

7C06. Biomass: Wet Biomass Stoker/Sloped Grate/Other

Commenter Name: Paul Noe
Commenter Affiliation: American Forest & Paper Association (AF&PA) et al.
Document Control Number: EPA-HQ-OAR-2002-0058-3521-A1
Comment Excerpt Number: 63

Comment: Biomass Wet Stoker/Sloped Grate/Other. Stoker/sloped grate/other unit designed to burn wet biomass means the unit is in the units designed to burn biomass/biobased solid subcategory that is either a stoker, sloped grate, or other combustor design and more than 10 percent of the annual amount of biomass/bio-based solid fuel combusted in the unit exceeds 20 percent moisture (annual average, as-fired), on a heat input basis. The wet biomass stoker/sloped grate/other unit subcategory should be based on units burning at least 10 percent wet biomass on an annual basis (for consistency with other subcategories that have a 10 percent cutoff); the 20 percent moisture content specification should be based on an annual average basis, since the moisture content of dry biomass can vary (for example, lumber mills avoid over-drying the wood, a work practice that minimizes energy use and limits emissions).

Response: The EPA thanks the commenter for their recommended revisions to the definition of the Stoker/sloped grate/other unit designed to burn wet biomass subcategory. We agree that it is appropriate to define the moisture specification on an annual heat input basis due to the inherent variability (i.e., annual basis) of the moisture content and to be consistent with the criteria listed for determining applicability of other subcategories. In the final rule, the definition specifies that the biomass fuel must exceed 20 percent moisture on an annual heat input basis.

7D01. Liquid

Commenter Name: Sarah E. Amick
Commenter Affiliation: Rubber Manufacturers Association (RMA)
Document Control Number: EPA-HQ-OAR-2002-0058-3503-A1
Comment Excerpt Number: 15

Comment: Although EPA set separate emission limits for PM and CO for the light and heavy fuel subcategories, EPA did not set separate limits for Hg and HCl. Hg and HCl are fuel based pollutants. Light liquid fuels include distillate oil, biodiesel and vegetable oil. Heavy liquids include all other liquid fuels that are combusted in boilers, including byproduct liquid fuels generated at industrial facilities and residual oil. Because emissions of Hg and HCl are based on the type of fuel that is combusted, RMA recommends that EPA set separate emission limits for Hg and HCl for the light and heavy fuel subcategories.

Response: The Hg and HCl MACT floor emission limits for liquid boilers in the final rule are calculated from emissions data from both heavy and light liquid fuels. The EPA therefore disagrees with the commenter, as available emissions data show that the two types of fuels can exhibit similar emissions profiles for Hg and HCl. See the memorandum entitle "Revised MACT Floor Analysis (May 2012) for the Industrial, Commercial, and Institutional Boilers and Process Heaters National Emission Standards for Hazardous Air Pollutants – Major Source" in the docket.

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 63

[EPA–HQ–OAR–2002–0058; FRL–9503–6]

RIN 2060–AR13

National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule; Reconsideration of final rule.

SUMMARY: On March 21, 2011, the EPA promulgated national emission standards for the control of hazardous air pollutants from new and existing industrial, commercial, and institutional boilers and process heaters at major sources of hazardous air pollutants. On that same day, the EPA also published a notice announcing its intent to reconsider certain provisions of the final rule. The EPA subsequently issued a notice on May 18, 2011, to postpone the effective dates of the final rule until judicial review has been completed, or the agency finalizes its reconsideration of the standard, whichever is earlier. In the action to postpone the effective dates of the rule, the EPA also requested the public to submit data and information to assist the EPA in its reconsideration. Following these actions, the Administrator received several petitions for reconsideration. In response to the March 21, 2011, notice announcing its intent to initiate reconsideration and the petitions submitted, the EPA is reconsidering and requesting comment on several provisions of the final rule. Additionally, the EPA is proposing amendments and technical corrections to the final rule to clarify definitions, references, applicability, and compliance issues raised by stakeholders subject to the final rule.

DATES: *Comments.* Comments must be received on or before February 21, 2012.

Public Hearing. We will hold a public hearing concerning the proposed items for reconsideration. Persons interested in presenting oral testimony at the hearing should contact Ms. Teresa Clemons at (919) 541–7689 or at *clemons.teresa@epa.gov* by January 3, 2012. If no one requests to speak at the public hearing by January 3, 2012, then the public hearing will be cancelled. We will specify the date and time of the public hearings on *http://www.epa.gov/ttn/atw/boiler/boilerpg.html.*

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2002–0058, by one of the following methods:

- *http://www.regulations.gov:* Follow the instructions for submitting comments.
- *Email:* Comments may be sent by email to *a-and-r-Docket@epa.gov,* Attention Docket ID No. EPA–HQ–OAR–2002–0058.
- *Fax:* Fax your comments to: (202) 566–9744, Attention Docket ID No. EPA–HQ–OAR–2002–0058.
- *Mail:* Send your comments to: EPA Docket Center (EPA/DC), Environmental Protection Agency, Mailcode: 2822T, 1200 Pennsylvania Ave. NW., Washington, DC 20460, Docket ID No. EPA–HQ–OAR–2002–0058. Please include a total of two copies. In addition, please mail a copy of your comments on the information collection provisions to the Office of Information and Regulatory Affairs, OMB, Attn: Desk Officer for EPA, 725 17th St. NW., Washington, DC 20503.
- *Hand Delivery.* In person or by courier, deliver comments to: EPA Docket Center (2822T), EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC 20460. Such deliveries are only accepted during the Docket's normal hours of operation (8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays), and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OAR–2002–0058. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be confidential business information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *http://www.regulations.gov* or email. The *http://www.regulations.gov* Web site is an "anonymous access" system, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to the EPA without going through *http://www.regulations.gov,* your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, the EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket, visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.*

Docket: All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information is not publicly available, *e.g.,* CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the EPA Docket Center, EPA West Building, Room 3334, 1301 Constitution Ave. NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Docket Center is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Mr. Brian Shrager, Energy Strategies Group, Sector Policies and Programs Division, (D243–01), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; Telephone number: (919) 541–7689; Fax number: (919) 541–5450; Email address: *shrager.brian@epa.gov.*

SUPPLEMENTARY INFORMATION:

Organization of this Document. The following outline is provided to aid in locating information in this preamble.

IV. Actions We Are Taking

In this notice, we are granting reconsideration of, and requesting comment on, issues presented in the March 21, 2011, reconsideration notice as well as a subset of other issues raised by petitioners in their petitions for reconsideration. Section V of this preamble summarizes these issues and discusses our proposed responses to each issue.

We have revised the rule language to address provisions related to the reconsideration and are requesting comment on the revised rule text to clarify definitions, applicability, compliance and references to various sections of the rule. Finally, we are proposing technical corrections to certain applicability and compliance provisions in the final rule.

We are seeking public comment only on the issues specifically identified in Section V of this action. We will not respond to any comments addressing other aspects of the final rule or any other related rulemakings.

V. Discussion of Issues for Reconsideration

This section of the preamble contains EPA's basis for our responses to certain issues identified in the petitions for reconsideration and the changes to the rule that we are proposing. We solicit comment on all responses and revisions discussed in the following sections:

A. Surrogates and Selected Regulated Pollutants

1. Alternative Total Selected Metals Limit. Multiple petitioners requested that EPA include an emission limit for TSM as an alternative to the PM limits in the final rule, particularly for biomass units, as part of the reconsideration. After assessing the available data, the EPA determined that inclusion of these limits is appropriate for some subcategories, and the EPA is proposing TSM limits for each subcategory of units that combust solid fuels or Gas 2 fuels. Sources will have the option of meeting either the TSM limit or the alternative PM limit. The TSM measurement, which directly quantifies the HAP metals rather than relying on a surrogate, is a more direct measurement of HAP than PM and is, therefore, appropriate as a pollutant group for regulation with numeric emission limits. For this rule, TSM includes the following eight metals: Arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, and selenium. The EPA selected these eight metals, rather than all of the HAP metals other than Hg, because more test data are available for these metals than for the other two HAP metals, cobalt and antimony. The use of 8 of 10 metals should have little or no impact on a facility's selection of controls to meet the standards, and the controls that would be used to reduce emissions of the eight metals would be equally effective in reducing emissions of the other two metals. Therefore, TSM can serve as a surrogate for all metallic HAP except for Hg, which the final rule regulates separately.

For the light liquid, heavy liquid and non-continental liquid units subcategories, we are not proposing alternative TSM emission limits. Instead, we are proposing that these units meet the filterable PM emission limits in all instances. We are not proposing the TSM alternative because of the limited emission test data for TSM and the large variability in the TSM data for these subcategories. Using the EPA's maximum achievable control technology (MACT) floor methodology, the alternative TSM limits resulted in MACT floor values which do not appear to represent the actual performance of the best performing units. The EPA has sent follow-up inquiries to facilities to confirm these data, and is soliciting comment on whether alternative TSM limits are appropriate for the subcategories of units designed to combust liquid fuels. The EPA also is soliciting comment on whether an alternative approach to calculating the TSM MACT floors for these units is appropriate. If the EPA receives sufficient information that supports the alternative TSM standards for units designed to combust liquid fuels, we will consider adopting these limits in the final rule.

2. Work Practice for Dioxin/Furan Emissions. Multiple petitioners requested that EPA reassess the potential for applying work practice standards for dioxins/furans in lieu of numeric emission limits. The EPA has re-assessed the dioxin/furan data sets and has determined that, similar to data for electric utilities for which work practice standards were proposed for dioxins/furans, the large majority of the emission measurements for all of the subcategories are below the level that can be accurately measured using EPA Method 23. While the EPA recognized this as an issue prior to issuing the final rule, sufficient time was not available to fully analyze the issue. For this proposal, the EPA conducted extensive analyses to determine the lowest level of emissions that can be accurately measured using EPA Method 23. The percentages of measurements (test runs) below the method detection level (a level at which the pollutant is known to be present but is not accurately quantified) is about 55 percent, which is 10 percent lower than the percentage for electric utilities. However, in addition to the high percentage of measurements below the method detection level, a very high percentage of measurements are below the level that can be accurately measured (see section V.E.3 of this preamble) for each subcategory. Those percentage are as follows: Coal stoker—100 percent; coal fluidized bed—89 percent; pulverized coal—85 percent; biomass stoker/other—100 percent; biomass fluidized bed—100 percent; biomass dutch oven/pile burner—80 percent; biomass fuel cell—100 percent; heavy liquid—96 percent; light liquid—100 percent; gas 2 (other process gases)—100 percent; non-continental liquid—100 percent (based on No. 6 oil data). While data are not available for two of the biomass subcategories, there is no reason to believe that dioxin emissions for those subcategories would be different than for the other biomass-based subcategories. Based on the percentages of data below the method detection limit coupled with the percentage of data below the level that can be accurately quantified, the EPA concludes that emissions from industrial boilers and process heaters cannot practicably be measured, and the EPA is now proposing work practice standards in place of numeric emission limits for dioxin/furan. The work practice standards require an annual tune-up to ensure good combustion. Details on the assessment of the minimum level that can be accurately measured can be found in the docket memorandum entitled "Updated data and procedure for handling below detection level data in analyzing various pollutant emissions databases for MACT and RTR emissions limits." We do not expect that the change from numeric emission limits to work practice standards will result in less public health protection because the levels of dioxin emitted from units in the source category are at or near current detection level capabilities, and we are not aware of any emissions controls that are demonstrated to reduce dioxin emissions from the low levels indicated by the available data for boilers and process heaters.

B. Output-Based Standards

1. Revisions to Boiler Efficiency Analysis

Petitioners requested that the EPA reassess the calculation of boiler efficiency, which is the key calculation in the development of output-based standards, because the EPA's calculations often resulted in efficiencies that were unrealistically high, often above 100 percent, which is a physical impossibility. The petitioners attributed this to the fact that the EPA had disregarded feedwater temperature (industry average being 280 degrees F). The inclusion of feedwater temperature provides the correct assessment of boiler efficiency because it accounts for the heat energy that is supplied by steam from the boiler to heat the feedwater. The steam used to heat the feedwater is supplied by the boiler and was reported by facilities as part of the boiler "steam output," but was not accounted for in the final rule efficiency calculations. Thus, the EPA has modified the development of the revised output-based emission limits to include the heat (energy) associated with the feedwater. The revised boiler efficiencies of the best performing units for each subcategory were determined by the equation:

Boiler Efficiency = (Steam output (Btu) − Feedwater Input (Btu))/(Fuel Input (Btu))

To calculate "feedwater input (Btu)", we used the industry average temperature of 280 degrees F and determined a heat content value of 249.3 Btu/lb. Unit operators provided the "steam output (Btu)" for each best performing unit in response to the EPA's information gathering efforts. For all best performing units reporting this steam energy output data, we calculated boiler efficiencies, as well as corresponding input-to-output conversion factors (CF). We averaged CF from the best performing units that have realistic boiler efficiencies averaged and assigned a subcategory-specific conversion factor. Finally, we applied the revised average CF to the proposed input-based emission limits to develop the revised alternate output-based limits. The resultant proposed output-based limits provide a compliance option that achieves emission reductions equivalent to those achieved by the input-based limits and encourage energy efficiency.

2. Other Changes to Output-Based Provisions

a. Accommodating Emissions Averaging Provisions. In order to allow for emissions averaging for units that elect to comply with the output-based emission limits, the EPA is proposing to add additional equations to the rule to allow for emissions averaging as requested by petitioners. Averaging of output based limits was not included in the final rule due to time constraints, but there is no technical reason why averaging of output-based limits is inappropriate. The output-based limits are equivalent to the input-based limits and promote energy efficiency, and, therefore, EPA is proposing to allow averaging for units that elect to comply with the output-based standards.

b. Output-Based Standards for Units that Generate Electricity. Petitioners pointed out that the final output-based standards were not designed to consider efficiency improvements from units that generate electricity only. In response to this concern, the EPA is proposing to add language to the definition of "Steam output" that addresses boilers that only produce electricity. The language provides fuel-specific conversion factors for electricity generating units that result in output-based standards in units of pounds per megawatt-hour.

c. Clarification that output-based standards are alternative standards. Petitioners requested that the EPA clarify in the tables that the output-based standards are alternative standards to the input-based standards. The EPA is proposing regulatory text to make this clarification.

d. Legal Authority for Emission Credits. One petitioner questioned the legal authority of the emission credit system and stated that it should be removed from the final rule. However, the petitioner provided no support for its position, and the EPA continues to believe that the emission credit system is consistent with the CAA as promulgated. Therefore, no changes are being proposed. However, we are specifically requesting comment on: (1) The overall concept of the emission credit provision, (2) how to administer it consistently across the country, and (3) available guidelines to inform the delegated authority's decision to approve the implementation plan.

C. Subcategories

In the final rule, the EPA added subcategories for hybrid suspension/grate biomass units, limited-use units, solid fuel units, and non-continental liquid units. The EPA also added a fuel specification to the final rule that would allow units combusting gases not defined as "Gas 1" gases to qualify as Gas 1 units by demonstrating that the fuels combusted meet a fuel specification. Petitioners requested that EPA allow comment on these subcategory changes and the fuel specification, and EPA is now soliciting comments on these portions of the final rule, including the changes and particular issues described in sections [1 through 7] below. Petitioners also requested additional subcategories, clarification of several subcategory definitions, and changes to some of the subcategory definitions.

1. *Solid Fuel.* The EPA added a solid fuel subcategory to the final rule that replaced previously proposed separate subcategories for units designed to burn solid fossil-based fuels and units designed to burn solid bio-based fuels. The solid fuel subcategory applied to pollutants identified in the final rule as fuel-based pollutants (PM, HCl, and Hg). Standards for combustion-based pollutants (CO and dioxin/furan), however, were based on specific subcategories for the various types of combustion units, including the specific fuel types the units were designed to combust. The rationale for the change is presented in the preamble to the final rule and the EPA is, in this action, soliciting comments on the solid fuel subcategory.

One significant change is also being proposed related to the solid fuel subcategory. Several petitioners provided information to support the position that PM should be considered a combustion-based pollutant rather than a fuel-based pollutant. After assessing the points raised by the petitioners, the EPA determined that PM emissions are influenced both by fuel type and unit design. Therefore, it is appropriate to treat PM as a combustion-based pollutant. Differences in PM particle size, applicability of air-pollution controls to units combusting various fuels, and the lack of demonstration of certain control technologies on certain designs of boilers (*e.g.*, fabric filters are not used on any hybrid suspension grate boilers) suggest that PM is more appropriately classified as a combustion-based pollutant. Therefore, the EPA is now proposing separate PM limits for each "combustion-based" subcategory.

Emission limits for HCl and Hg were developed for the same subcategories as presented in the March 21, 2011, final rule; the only changes associated with the HCl and Hg emission limits are due to new data, corrections to old data, and inventory changes.

2. *Units Designed to Combust Liquid Fuels.* The EPA finalized a single subcategory covering liquid fuel-fired units (with limited exceptions such as non-continental liquid units and limited-used units). Petitioners requested that the EPA reconsider the liquid unit subcategories and include separate subcategories for units designed to combust light liquids and units designed to combust heavy liquids. Petitioners cited issues related to achievability of standards and the types of controls that are used on liquid units but did not cite design differences

that could be used to justify a subcategory. However, we identified several design differences, including the need for steam atomization or high-pressure atomization of heavy liquids, the need for heated storage vessels for heavy liquids in some climates, and the lack of a demonstration that the new source PM limit based on combustion of light liquid fuels had been achieved by any unit combusting heavy liquid fuels. Therefore, the EPA is proposing separate subcategories for heavy liquid-fired and light liquid-fired units for PM and CO, pollutants that are dependent on combustor design. Units designed to combust light and heavy liquids will continue to be grouped together in a liquid fuel subcategory for Hg and HCl, which are the fuel-based pollutants. Light liquids include distillate oil, biodiesel and vegetable oil. Heavy liquids include all other liquid fuels that are combusted in boilers, including byproduct liquid fuels generated at industrial facilities and residual oil. Units that combust any liquid fuels (and less than 10 percent coal/solid fossil fuel and less than 10 percent biomass/bio-based solid fuel) where at least 10 percent of the heat input from liquid fuels on an annual heat input basis comes from heavy liquids would be considered heavy liquid units. Units that combust any liquid fuels (and less than 10 percent coal/solid fossil fuel and less than 10 percent biomass/bio-based solid fuel) that are not part of the unit designed to burn heavy liquid subcategory would be considered light liquid units.

3. *Non-Continental Liquid Units.* The EPA finalized a subcategory for non-continental liquid units. Stakeholders did not have the opportunity to comment on this subcategory. Therefore, the EPA is now soliciting comments on the non-continental liquid unit subcategory. The preamble to the final rule presents the rationale for the establishment of the subcategory. *See* 76 FR 15635. The EPA also is proposing to revise several of the emission limits for non-continental liquid units due to the receipt of new emissions data for PM and CO from these units and the development of performance estimates based on the combustion of No. 6 fuel oil (rather than all types of liquid fuels). The rationale for estimating the performance of these units based on data from No. 6 oil units is presented below. Petitioners pointed out that non-continental units do not combust distillate oil because of availability issues. While non-continental liquid units typically combust refinery gas, they combust residual oil when process requirements necessitate supplementing the available refinery gas. The petitioners requested that, in the absence of data from non-continental units, emission limits for non-continental units be based on data from liquid units that combust residual oil. The EPA agrees that it would be appropriate to make this change for the combustion-based pollutants due to the design of these units and the unique constraints faced by these units. We now have data for both CO and PM from non-continental units, and there are no longer data gaps for these pollutants. We are thus able to establish numeric emission limits using data from within the subcategory. For fuel-based pollutants, Hg and HCl, the EPA determined that, based on the very limited data sets and the overlap of data for units designed to combust various liquid fuels, it is more appropriate to consider all liquid fuel-fired units together for the development of MACT emission limits. This is consistent with the treatment of Hg and HCl for solid fuel units.

4. *Liquid Units in Alaska.* A petitioner requested that liquid units in Alaska be included in the non-continental liquid unit subcategory or in a separate, newly created subcategory for units in Alaska. The petitioner stated that units in Alaska face the same difficulties with respect to the available supply of natural gas or refinery gas as the non-continental units. The commenter did not provide specific design differences from other types of liquid units. In addition, no test data are available for liquid-fired units in Alaska. Finally, while units in Alaska may face some unique constraints, the design of such units is different from the non-continental units because the units are designed to combust different fuels (*i.e.* non-continental units combust No. 6 fuel oil, which was not reported as a fuel for any unit in Alaska in the responses to the EPA's information collection request). For these reasons, the EPA is not proposing a subcategory for liquid units in Alaska and is not including these units in the non-continental subcategory. The EPA is, however, soliciting comment and supporting rationale on whether a subcategory for liquid units in Alaska is appropriate, and is requesting stack test data that could be used to establish MACT floors if such a subcategory is justified.

5. *Biomass.* Petitioners requested additional biomass subcategories and clarifications to the final subcategories. Suggestions included separate subcategories (for all pollutants) for boilers that are designed to combust kiln-dried wood and for hybrid suspension grate boilers designed to combust bagasse, clarification of which subcategory covers pile burners, and separation of the dutch oven and suspension burner subcategories. In addition to soliciting comment on the proposed changes described below, the EPA is requesting comment on whether additional subcategories are appropriate, as well as data and rationale in support of any additional subcategories.

a. *Boilers Designed to Combust Kiln-Dried Wood.* With respect to a separate subcategory for boilers designed to combust kiln-dried wood, the EPA is proposing a separate subcategory for these units based on the design of the boilers and the unique nature of the facilities that combust this material. These facilities are carefully integrated to utilize their available resources on-site, and the boilers are designed and sized to efficiently combust biomass that has already undergone a drying process that enhances the fuel quality. Care is taken within the facility to maintain the fuel moisture content at levels far lower than virgin biomass materials, typically less than 2 percent moisture. The EPA is proposing emission limits for PM and CO for this subcategory of units that we are calling biomass dry stokers. For HCl and Hg, the final rule's approach of regulating these pollutants under the "solid fuel subcategory" for all solid fuel units has not changed.

b. *Hybrid Suspension Grate Boilers Designed to Combust Bagasse.* In the final rule, the EPA added a subcategory for hybrid suspension/grate boilers, which included boilers that are designed to combust very wet biomass fuels such as bagasse. The rationale for the establishment of the subcategory is presented in the preamble to the final rule. *See* 76 FR 15634–15635. Petitioners pointed out that in addition to their unique designs that provide fuel drying within the combustor, these units are highly integrated into the sugar production process and primarily combust specific materials that are generated on-site. Petitioners emphasized that the particle size profile from these units differs significantly from units designed to combust other types of fuels. As discussed in section V.C.1 of this preamble, the EPA is now considering PM to be a "combustion based" pollutant. Accordingly, the EPA is proposing emission limits for PM (along with an alternate TSM standard) and CO for these types of units. For HCl and Hg, the final rule's approach of regulating these pollutants under the "solid fuel subcategory" for all solid fuel units has not changed.

c. *Clarification of Subcategories for Pile Burners, Dutch Ovens, and Suspension Boilers.* The final rule did not address pile burners, and it established a single subcategory that covered dutch ovens and suspension boilers. Petitioners pointed out that dutch ovens and suspension boilers are inherently different types of boilers and requested EPA to create separate subcategories for those types of units. Petitioners also pointed out that pile burners are very similar to dutch ovens, and, as such, should be included in the dutch oven subcategory. The EPA evaluated these clarification requests and determined that the petitioners' points regarding the design and other differences between dutch ovens and suspension boilers are valid. The EPA agrees that dutch ovens and pile burners should be included in the same subcategory and suspension burners should be a separate subcategory. Therefore, the EPA is proposing separate emission limits for the combustion-based pollutants for these subcategories. All of these types of units will remain in the solid fuel subcategory for the fuel-based pollutants.

6. *Gaseous Fuel Specification.* Multiple petitioners requested reconsideration of the fuel specification that the EPA finalized but did not propose. Petitioners correctly pointed out that the levels of the fuel specification were based only on natural gas and suggested that it would be appropriate to base the fuel specification on levels of contaminants in either natural gas or refinery gas. Petitioners further pointed out that a fuel specification for hydrogen sulfide (H_2S) is not directly related to potential HAP emissions from boilers and process heaters and the H_2S fuel specification should be eliminated from the rule. The EPA has reexamined the fuel specification and agrees that the key contaminant for demonstration of comparability from a HAP perspective is Hg and that the H_2S fuel specification that was finalized does not provide a direct indication of potential HAP from combustion of gaseous fuel. Accordingly, the EPA is proposing a fuel specification based only on the Hg level in the gaseous fuel, and that level is the same level that the EPA included in the March 2011 final rule. The rationale for the Hg fuel specification is included in the preamble to the final rule. *See* 76 FR 15639.

One petitioner stated that the inclusion of a fuel specification demonstrates that emissions can be measured from the units that combust the gaseous fuels, and therefore, the units cannot be regulated by a work practice standard. Regarding this point, the EPA recognizes that the contaminants in the fuel may be able to be measured, but the resulting emissions from combustion of the fuel are another matter entirely. For instance, a unit that combusts a fuel that meets the fuel specification for Hg will have demonstrated that its fuel contains an amount of Hg that is comparable to that found in natural gas. The emissions data for natural gas-fired units show the overwhelming majority of emissions to be below the level that can be accurately quantified by the available test methods. Therefore, the same is expected of units combusting gases with similar contaminant levels to natural gas. Thus, a work practice standard is the appropriate standard for these units. The EPA also is requesting comment on whether additional parameters should be included in the fuel specification.

7. *Work Practices for Limited-Use Units.* The EPA added a subcategory for limited-use units in the final rule, and petitioners requested an opportunity to comment on the creation of the subcategory and the definition of the subcategory. Specifically, multiple petitioners requested that rather than defining the subcategory to include units that operate less than 10 percent of the hours in a year, the EPA define the subcategory to include units that operate with a capacity factor of 10 percent or less. The petitioners believe that such a change would provide more flexibility, but petitioners did not provide support that such a subcategory would qualify for work practice standards under section 112 the CAA. Therefore, the EPA is not proposing a change to the final approach but is requesting comment on how a subcategory defined with a 10 percent capacity factor would qualify for work practice standards in lieu of emission limits. The EPA also is requesting comment on the limited-use subcategory as finalized, and the rationale for the creation of that subcategory can be found in the preamble to the final rule. *See* 76 FR 15634.

D. Monitoring

1. Oxygen monitoring. Petitioners requested reconsideration of the requirement for installation of oxygen monitoring systems on the outlet of the boiler combustion chamber for numerous technical reasons. Several parties expressed concern regarding this location as it is known to be highly stratified, making it very difficult to find a representative location and certify the instrumentation. In reviewing alternatives to this requirement we find that rather than requiring monitoring of oxygen levels in the stack that follows a combustion unit, a better way to ensure good combustion is by requiring the installation, calibration, monitoring and use of oxygen trim systems to optimize air to fuel ratio and combustion efficiency. We agree with petitioners that use of the data from such devices is not only an appropriate control for efficient combustion and a less burdensome alternative to monitoring stack oxygen concentration but also is a better system for many types of units that experience significant load swings and operate with high levels of excess air. Many units are already fitted with these controls, and this proposed change will reduce the monitoring burden for affected units. These systems will provide adequate combustion control to maintain compliance with the CO emission levels demonstrated during the performance test. We seek comment on the appropriateness of using these controls operated as, and for the purposes, described.

2. *PM CEMS.* Petitioners requested reconsideration of the use of PM CEMS as compliance monitors for coal, biomass and residual oil units with heat input capacity greater than 250 MMBtu/hr. Petitioners emphasized that PM CEMS are not demonstrated for biomass units and requested EPA to remove the requirement because of technical issues related to PM particle size and the inability of PM CEMS effectively measure PM from biomass units. Petitioners also stated that PM CEMS are not demonstrated at the low levels that are required by the rule. The EPA agrees that PM CEMS are not demonstrated for biomass units and that significant technical concerns exist regarding the technology's ability to monitor emissions from biomass units. The technical concerns include the fact that PM CEMS are calibrated and certified to measure emissions from a single fuel type. A change in fuel would require a change in the calibration curve of the PM CEMS instrument. The unpredictable variety of biomass fuel constituents as well as biomass fuel moisture content make relying on a single calibration point problematic in terms of compliance assessment when these fuel components change. Furthermore, it is impracticable to replicate, during performance testing, all of the varying fuel conditions necessary for calibrating the monitor. For all of these reasons, it is impractical to appropriately apply PM CEMS to provide the accuracy necessary for

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Part V

Environmental Protection Agency

40 CFR Part 63
National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 63

[EPA–HQ–OAR–2002–0058; FRL–9272–8]

RIN 2060–AQ25

National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: On September 13, 2004, under authority of section 112 of the Clean Air Act, EPA promulgated national emission standards for hazardous air pollutants for new and existing industrial/commercial/institutional boilers and process heaters. On June 19, 2007, the United States Court of Appeals for the District of Columbia Circuit vacated and remanded the standards.

In response to the Court's vacatur and remand, EPA is, in this action, establishing emission standards that will require industrial/commercial/institutional boilers and process heaters located at major sources to meet hazardous air pollutants standards reflecting the application of the maximum achievable control technology. This rule protects air quality and promotes public health by reducing emissions of the hazardous air pollutants listed in section 112(b)(1) of the Clean Air Act.

DATES: This final rule is effective on May 20, 2011. The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of May 20, 2011.

ADDRESSES: EPA established a single docket under Docket ID No. EPA–HQ–OAR–2002–0058 for this action. All documents in the docket are listed on the *http://www.regulations.gov* Web site. Although listed in the index, some information is not publicly available, *e.g.*, confidential business information or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically through *http://www.regulations.gov* or in hard copy at EPA's Docket Center, Public Reading Room, EPA West Building, Room 3334, 1301 Constitution Avenue, NW., Washington, DC 20004. This Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1741.

FOR FURTHER INFORMATION CONTACT: Mr. Brian Shrager, Energy Strategies Group, Sector Policies and Programs Division, (D243–01), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; Telephone number: (919) 541–7689; Fax number (919) 541–5450; E-mail address: *shrager.brian@epa.gov.*

SUPPLEMENTARY INFORMATION: The information presented in this preamble is organized as follows:

I. General Information

A. Does this action apply to me?

The regulated categories and entities potentially affected by the final standards include:

Category	NAICS code [1]	Examples of potentially regulated entities
Any industry using a boiler or process heater as defined in the final rule.	211	Extractors of crude petroleum and natural gas.

data for most performance tests will ensure that emissions factors, when updated, represent accurately the most current operational practices. In summary, receiving test data already collected for other purposes and using them in the emissions factors development program will save industry, State/local/Tribal agencies, and EPA time and money and work to improve the quality of emissions inventories and related regulatory decisions.

As mentioned earlier, the electronic data base that will be used is EPA's WebFIRE, which is a database accessible through EPA's TTN. The WebFIRE database was constructed to store emissions test and other data for use in developing emissions factors. A description of the WebFIRE data base can be found at *http://cfpub.epa.gov/oarweb/index.cfm?action=fire.main.*

Source owners and operators will be able to transmit data collected via the ERT through EPA's Central Data Exchange (CDX) network for storage in the WebFIRE data base. Although ERT is not the only electronic interface that can be used to submit source test data to the CDX for entry into WebFIRE, it makes submittal of data very straightforward and easy. A description of the ERT can be found at *http://www.epa.gov/ttn/chief/ert/ert_tool.html.*

Source owners and operators must register with the CDX system to obtain a user name and password before being able to submit data to the CDX. The CDX registration page can be found at: *https://cdx.epa.gov/SSL/CDX/regwarning.asp?Referer=registration.* If they have a current CDX account (*e.g.*, they submit reports for EPA's Toxic Release Inventory Program to the CDX), then the existing user name and password can be used to log in to the CDX.

IV. Summary of Significant Changes Since Proposal

A. Applicability

Since proposal, several changes to the applicability of this final rule have been made. First, at proposal, we excluded all units that combust solid waste from the standards, but we have extended the coverage of this final rule to boilers and process heaters that combust solid waste but are exempt, by statute, from section 129 incinerator rules because they are qualifying small power producers or cogeneration units that combust a homogeneous waste stream. This final rule continues to exclude other waste burning units. This is a clarifying change that is consistent with the intent of the proposed rule to establish emissions standards for all boilers and process heaters that are not solid waste incineration units subject to regulation under section 129.

The proposed rule definition of coal was revised to include all types of fossil-based fuels in the coal definition. The final coal definition is: "*Coal* means all solid fuels classifiable as anthracite, bituminous, sub-bituminous, or lignite by the American Society for Testing and Materials in ASTM D388–991, "Standard Specification for Classification of Coals by Rank" (incorporated by reference, *see* § 63.14(b)), coal refuse, and petroleum coke. For the purposes of this subpart, this definition of "coal" includes synthetic fuels derived from coal for the purpose of creating useful heat, including but not limited to, solvent-refined coal, coal-oil mixtures, and coal-water mixtures. Coal derived gases are excluded from this definition." Similarly, for biomass, the definition of biomass fuel was revised to include any potential biomass-based fuels. This is also a clarifying change consistent with the intent of the proposed rule as described above. The final definition is: "Biomass or bio-based solid fuel means any solid biomass-based fuel that is not a solid waste. This may include, but is not limited to, the following materials: Wood residue; wood products (*e.g.*, trees, tree stumps, tree limbs, bark, lumber, sawdust, sanderdust, chips, scraps, slabs, millings, and shavings); animal manure, including litter and other bedding materials; vegetative agricultural and silvicultural materials, such as logging residues (slash), nut and grain hulls and chaff (*e.g.*, almond, walnut, peanut, rice, and wheat), bagasse, orchard prunings, corn stalks, coffee bean hulls and grounds. This definition of biomass fuel is not intended to suggest that these materials are or not solid waste."

The proposed rule included a definition of waste heat boiler that excluded from the definition units with supplemental burners that are designed to supply 50 percent or more of the total rated heat input capacity. The final definition was revised to include all waste heat boilers. The final definition is: "Waste heat boiler means a device that recovers normally unused energy and converts it to usable heat. Waste heat boilers are also referred to as heat recovery steam generators." Similarly, the waste heat process heater definition was revised to read as follows: "Waste heat process heater means an enclosed device that recovers normally unused energy and converts it to usable heat. Waste heat process heaters are also referred to as recuperative process heaters." These changes were made in order to exempt the types of units intended at proposal.

The proposed rule exempted blast furnace gas fuel-fired boiler or process heaters, and defined these units as units combusting 90 percent or more of its total heat input from blast furnace gas. We have changed the requirement to 90 percent or more of its total volume of gas in this final rule. This change was made so that the units that were intended to be exempted from this final rule would be exempted. The wording of the proposed exemption did not exempt units that were intended to be exempted because the heating value of blast furnace gas is not as high as that of natural gas.

The proposed rule exempted units that are an affected source in another MACT standard. We amended this language to include any unit that is part of the affected source subject to another MACT standard. We also exempted any unit that is used as a control device to comply with another MACT standard, provided that at least 50 percent of the heat input is provided by the gas stream that is regulated under another MACT standard. This change was made in order to encourage the recovery of energy from high heating value gases that would otherwise be flared.

B. Subcategories

In the proposed rule, for the fuel-dependent HAP (metals, Hg, acid gases), we identified the following five basic unit types as subcategories: (1) Units designed to burn coal, (2) units designed to burn biomass, (3) units designed to burn liquid fuel, (4) units designed to burn natural gas/refinery gas, and (5) units designed to burn other process gases. In this final rule, for fuel-dependent HAP, we combined the subcategories for units designed to combust coal and biomass into a subcategory for units designed to burn solid fuels. We changed the subcategory for units designed to burn natural gas/refinery gas to a subcategory for units that burn natural gas, refinery gas, and other clean gas. We also added subcategories for non-continental liquid units and limited-use units.

As described in the preamble to the proposed rule, within the basic unit types there are different designs and combustion systems that, while having a minor effect on fuel-dependent HAP emissions, have a much larger effect on pollutants whose emissions depend on the combustion conditions in a boiler or process heater. In the case of boilers and process heaters, the combustion-related pollutants are the organic HAP. In the proposed rule, we identified the following 11 subcategories for organic HAP: (1) Pulverized coal units; (2) stokers designed to burn coal; (3) fluidized bed units designed to burn coal; (4) stokers designed to burn biomass; (5) fluidized bed units designed to burn biomass; (6) suspension burners/dutch ovens designed to burn biomass; (7) fuel cells designed to burn biomass; (8) units designed to burn liquid fuel; (9) units designed to burn natural gas/refinery gas; (10) units designed to burn other gases; and (11) metal process furnaces. In this final rule, we added subcategories for biomass suspension/grate units, non-continental liquid units, and limited-use units.

C. Emission Limits

The proposed rule included numerical emission limits for PM, Hg, HCl, CO, and dioxin/furan, and limits for those same pollutants are included in this final rule. Unlike the proposed rule, we included a compliance alternative in the final rule to allow owners and operators of existing affected sources to demonstrate compliance on an output-basis instead of on a heat input basis. Compliance with the alternate output-based emission limits would require measurement of boiler operating parameters associated with the mass rate of emissions and energy outputs. If you elect to comply with the alternate output-based emission limits, you must use equations provided in the final rule to demonstrate that emissions from the applicable units do not exceed the output-based emission limits specified in the final rule. If you use this compliance alternative using the emission credit approach, you must also establish a benchmark, calculate and document the emission credits generated from energy conservation measures implemented, and develop and submit the implementation plan no later than 180 days before the date that the facility intends to demonstrate compliance.

D. Work Practices

This final rule includes work practice standards for most of the same units for which we proposed work practice standards, including new and existing units in the Gas 1 subcategory, existing units with heat input capacity less than 10 MMBtu/hr, and new and existing metal process furnaces. In addition to those subcategories for which we proposed work practices, this final rule includes work practices for all units during periods of startup and shutdown, new units with heat input capacity less than 10 MMBtu/hr, limited use units, and units combusting other clean gases. Other clean gases are gases, other than natural gas and refinery gas (as defined in this final rule), that meet contaminant level specifications that are provided in the final rule.

E. Energy Assessment Requirements

In this final rule, we have expanded the definition of energy assessment with respect to the requirements of Table 3 of this final rule, by providing a duration for performing the energy assessment and defining the evaluation requirements for each boiler system and energy use system. These requirements are based on the total annual heat input to the affected boilers and process heaters.

This final rule requires an energy assessment for facilities with affected boilers and process heaters using less than 0.3 trillion Btu per year (TBtu/y) heat input to be one day in length maximum. The boiler system and energy use system accounting for at least 50 percent of the energy output from these units must be evaluated to identify energy savings opportunities within the limit of performing a one day energy assessment. An energy assessment for a facility with affected boilers and process heaters using 0.3 to 1 TBtu/year must be three days in length maximum. From these boilers, the boiler system and any energy use system accounting for at least 33 percent of the energy output will be evaluated, within the limit of performing a three day energy assessment. For facilities with affected boilers and process heaters using greater than 1 TBtu/year heat input, the energy assessment must address the boiler system and any energy use system accounting for at least 20 percent of the energy output to identify energy savings opportunities.

The expanded definition for energy assessment clarifies the duration and requirements for each energy assessment for various units based on energy use. We have also added a definition for steam and process heating systems to clarify the components for each boiler system which must be considered during the energy assessment, including elements such as combustion management, thermal energy recovery, energy resource selection, and the steam end-use management of each affected boiler.

Lastly, we have clarified the requirement in Table 3 to evaluate facility energy management practices as part of the energy assessment and a definition of an energy management program was added. The use of the ENERGY STAR Facility Energy Assessment Matrix as part of this review is recommended, but it was removed as a requirement in Table 3. The definition of an energy management program added to the rule is consistent with the ENERGY STAR Guidelines for Energy Management that can be referenced for further guidance. ENERGY STAR provides a variety of tools and resources that support energy management programs. For more information, visit *http://www.energystar.gov*.

F. Requirements During Startup, Shutdown, and Malfunction

For startup, shutdown, and malfunction (SSM), the requirements have changed since proposal. For periods of startup and shutdown, EPA is finalizing work practice standards, which require following manufacturers specifications for minimizing periods of startup and shutdown, in lieu of numeric emission limits. For malfunctions, EPA added affirmative defense language to this final rule for exceedances of the numerical emission limits that are caused by malfunctions.

G. Testing and Initial Compliance

The first significant change to the testing and initial compliance requirements is that units greater than 100 MMBtu/hr must comply with the CO limits using a stack test rather than CO CEMS. EPA also added optional output-based limits that promote energy efficient boiler operation. Another significant change is that for units combusting gaseous fuels other than natural gas or refinery gas, in order to qualify for the Gas 1 subcategory work practice standard, the gases that will be combusted must be certified to meet the contaminant levels specified for Hg and hydrogen sulfide (H_2S) in this final rule. Finally, EPA has changed the dioxin/furan testing requirement to a one-time compliance demonstration due to the low dioxin/furan emissions demonstrated by the vast majority of sources that have tested for dioxin/furan.

H. Continuous Compliance

The only significant change to the continuous compliance requirements is for monitoring of CO. Rather than using CO CEMS, as proposed, units will be required to continuously monitor and record the oxygen level in their flue gas during the initial compliance test and establish an operating limit that requires that the unit operate at an oxygen percentage of at least 90 percent of the operating limit on a 12-hour block average basis. Units will be required to continuously monitor oxygen to ensure continuous compliance.

source and cannot be precisely estimated, the requirement is clearly directionally sound and thus consistent with the requirement to examine beyond the floor controls. By definition, any emission reduction would be cost effective or else it would not be implemented.

Finally, with respect to the third argument, the requirement to perform the energy audit is, of course, a requirement that can be enforced and thus a standard. As noted, while we do not know the precise reductions that will occur at individual sources, the record indicates that energy assessments reduce fuel consumption and that parties will implement recommendations from an auditor that they believe are prudent. Therefore, the requirement to perform an energy assessment can both be enforced and will result in emission reductions.

We agree that EPA should provide a clear definition of what the energy assessment should encompass. However, we disagree that the energy assessment should be limited to only the boiler and associated equipment. EPA has properly exercised the authority granted to it pursuant to CAA section 112(d)(2) which states that "Emission standards promulgated * * * and applicable to new or existing sources shall require the maximum degree of reduction in [HAP] emissions that the Administrator determines * * * is achievable * * * through application of measures, processes, methods, systems or techniques including, but not limited to measures which * * * reduce the volume of, or eliminate emissions of, such pollutants through process changes, substitution of materials or other modifications * * *." The purpose of an energy assessment is to identify energy conservation measures (such as, process changes or other modifications to the facility) that can be implemented to reduce the facility energy demand from the affected boiler which would result in reduced fuel use. Reduced fuel use will result in a corresponding reduction in HAP, and non-HAP, emissions from the affected boiler. Reducing the energy demand from the plant's energy using systems can result in additional reductions in fuel use and associated emissions from the affected boilers. We agree that the scope of the required energy assessment needs to be clarified. However, in the proposed Boiler MACT, the intended scope of the energy assessment did extend beyond the affected boiler. The energy assessment did include a requirement that a facility energy management program be developed. The energy assessment was intended to be broader than the affected boiler and process heater and included other systems or processes that used the energy from the boiler and process heater. We disagree that the scope of the energy assessment should be limited to the boiler and directly associated components such as the feed water system, combustion air system, fuel system (including burners), blow down system, combustion control system, and heat recovery of the combustion fuel gas. Including the facility's energy using systems and energy management practices in the energy assessment can identify measures that result in decreased fuel use and related emission reductions. We have included in this final rule a definition of what the energy assessment should include for various size fuel consuming facilities. We also have included a definition of the qualified assessors who must be used to conduct those energy assessments.

We also agree that a facility should be exempt from the requirement to conduct an energy assessment if an energy assessment had recently been conducted. We have revised this final rule to allow facilities to comply with the requirement by submitting an energy assessment that had been conducted within 3 years prior to the promulgation date of this final rule.

C. Rationale for Subcategories

Many commenters stated that EPA should have proposed more subcategories, while others believed that too many subcategories were proposed. Many different issues were raised, and some of the key issues that led to changes in the rule include: The need for a limited use subcategory for boilers that operate for only a small percentage of hours during a year; the unique suspension/grate design of units that combust bagasse; the need for a non-continental liquid fuel subcategory for island units that have limited fuel options and other unique circumstances; and the appropriate subcategory for mixed fuel units. The comments and EPA responses are provided below.

1. Limited Use Subcategory

Comment: Industry representatives and State and local governments argued that limited use units are significantly different from steady-state units and requested that they have their own subcategory. Commenters requested various thresholds for a limited-use subcategory including 10 percent annual capacity factor or 1,000 hours of operation per year. Several commenters stated that due to their function, limited use boilers spend a larger percentage of time in startup, shutdown, or other reduced-efficiency operating conditions than either base-loaded or load-following (continuously operated) units. Operating more frequently in these conditions makes emissions profiles of limited use units very different from sources which operate in more efficient steady-state modes. Based on this, commenters claimed it would be technically infeasible for limited-use units to meet the proposed emission limits.

In addition to technical reasoning, commenters also submitted requests for a limited-use subcategory on the basis of regulatory precedent, citing the 2010 RICE MACT and 2004 vacated Boiler MACT. Several commenters requested a subcategory and work practices similar to those in the Stationary RICE NESHAP. Several other commenters also stated that the subcategory was warranted because it was included in the previous Boiler MACT rule. These commenters argued that EPA had not provided any justification for eliminating the subcategory in the proposed rule. Some of these commenters also stated that the recordkeeping requirements that were proposed in Section 63.7555(d)(3) for limited-use boilers and process heaters should be the only requirement for these units.

The majority of commenters that requested a limited use subcategory also requested for EPA to adopt a work practice standard for limited use units and not subject the subcategory to emissions testing or monitoring. Commenters argued that EPA has acknowledged that there is no proven control technology for organic HAP emissions from limited use units. Limited use units, such as emergency and backup boilers, cannot be tested effectively due to their limited operating schedules. Based on existing test methods, which require a unit to operate in a steady state, limited use units would have to operate for the sole purpose of emissions testing. One commenter claimed that the proposed rule performance testing would require, not including startup and stabilization, operating at least 15 additional hours of per year, or 24 hours per year if testing for all pollutants is required. Commenters also noted that because the operation of these units is neither predictable nor routine over a 30 day period, back-up boilers would not benefit from 30-day emissions averaging. Commenters argued that establishing numerical standards for limited use units is contrary to the goals of the CAA and will lead to creating emissions for the sole purpose of demonstrating compliance.

Many commenters also mentioned the economic impacts of a numerical limit on limited-use units and requested work practice standards. Commenters stated that it would not be cost effective to install controls on units that operate at 10 percent capacity or less annually. They claimed that the additional controls would produce minimal emission reductions and would result in the shutdown of limited-use units.

Several commenters claimed that the current distinction between natural gas and oil-fired limited-use units is unnecessary, and that additional requirements for oil-fired units do not produce environmental benefits. Commenters recommended that EPA create a separate subcategory for limited use, oil-fired boilers and suggest that the work practice standard proposed for gas-fired boilers be applied in lieu of emissions standards for these units. Other commenters stated that the limited use subcategory should include new/reconstructed limited use units as well as existing units for all fuel categories. One commenter recommended a tiered approach and stated that for very limited use boilers, EPA should establish a standard with no additional controls or requirements, other than monitoring annual hours of operation. They defined very limited use as <500 hours of operation per year.

Response: EPA agrees that a subcategory for limited use units is appropriate for many of the reasons stated by the commenters. The fact that the nature of these units is such that they operate for unpredictable periods of time, limited hours, and at less than full load in many cases has lead EPA to determine that limited use units are a unique class of unit based on the unique way in which they are used and EPA is including a subcategory for these units in the final rule. The unpredictable operation of this class of units makes emission testing for the suite of pollutants being regulated impracticable. In order to test the units, they would need to be operated specifically to conduct the emissions testing because the nature and duration of their use does not allow for the required emissions testing. As commenters noted, such testing and operation of the unit when it is not needed is also economically impracticable, and would lead to increased emissions and combustion of fuel that would not otherwise be combusted. Therefore, we are regulating these units with a work practice standard that requires a biennial tune-up, which will limit HAP by ensuring that these units operate at peak efficiency during the limited hours that they do operate.

2. Combination Grate/Suspension Firing

Comment: Several commenters requested EPA further subcategorize boilers and process heaters according to combustor design. Three industry and collective trade group representatives requested EPA consider adding a bagasse boiler subcategory. These commenters claimed that bagasse boilers are different from other biomass boilers based on both fuel type and boiler design. The commenter suggested four factors EPA should consider when establishing similar sources or subcategories: (1) Do the units in the category have comparable emissions; (2) are the units structurally similar in design; (3) are the units structurally similar in size; and, (4) are the units capable of installing the same control technology. The commenter elaborated on the fuel density and moisture of bagasse fuel and highlights the unique combustor design needed to heat and evaporate the moisture from the fuel using a combination of suspension and grate firing. Several commenters requested that EPA set separate subcategories for organic HAP (or CO) and for metal HAP and PM for bagasse boilers (between 48 to 55 percent moisture), suspension burners designed to burn dry biomass (defined as less than 30 percent moisture), suspension burners designed to burn wet biomass (greater than 30 percent moisture), and Dutch ovens.

One commenter also requested that the regulatory definition of bagasse boiler be altered to take into account that bagasse boilers are hybrid suspension and grate/floor-fired boilers uniquely designed to dry and burn bagasse. The commenter goes on to explain that the majority of drying and combustion take place in suspension and the combustion is completed on the grate or floor. The boilers are designed to have high heat release rates and high excess air rates which are to evaporate high fuel moisture content and this design impacts CO, PM, and organic HAP formation. Under the proposal, most bagasse-fired boilers would be categorized as "suspension burners/dutch ovens designed to burn biomass." However, the commenter claimed that the CO limit for this subcategory was driven largely by emissions data from units which fire dry biomass (*i.e.*, less than 20 to 30 percent moisture fuel) that do not need to undergo this initial drying process, since the fuel is already dry enough to combust. The commenter elaborated that emissions of organic HAP and PM from these dry biomass suspension boilers are much different than boilers that must use a combination of suspension firing and grate firing in order to achieve complete combustion of a wet fuel such as bagasse.

One commenter went on the say that EPA has inappropriately subcategorized suspension burners/dutch ovens designed to burn biomass as a single subcategory. Hybrid suspension/grate-floor burners are designed such that the wet fuel first undergoes drying and then combustion in suspension within the furnace, with any remaining unburned fuel falling onto the grate to complete combustion. Another commenter also provided technical design elements to highlight the differences between dutch ovens, suspension burners, and the above mentioned hybrid suspension grate burners. This commenter indicated that dutch ovens have two chambers. Solid fuel is dropped down into a refractory lined chamber where drying and gasification take place in the fuel pile. Gases pass over a wall into the second chamber where combustion is completed. Dutch ovens are capable of burning high moisture fuels such as bark, but have low thermal efficiency and are unable to respond rapidly to changes in steam demand. On the contrary, suspension burners combust fine, dry fuels such as sawdust and sander dust in suspension. Rapid changes in combustion rate are possible with this firing method. This commenter added that some dutch oven units located at particleboard, hardboard, and medium density fiberboard plants were misclassified and there are less than 30 true dry-fired suspension burners in operation, and only a small handful of true dutch oven boilers.

Response: EPA agrees that for combustion-related pollutants (used as a surrogate for organic HAP emissions), the design differences for hybrid suspension grate boilers (also referred to as comination suspension/grate boilers) are significant, and that combustion conditions in these types of units are not similar to those in dutch ovens or true suspension burners that combust fine, dry fuels. Therefore, EPA has added a hybrid suspension grate boiler subcategory for CO and dioxin/furan emissions. However, the differences discussed by the commenters with respect to PM are less indicative of the design of the boiler and more indicative of the types of air pollution controls that are used. In keeping with the subcategorization approach being used for this final rule, these units, and all other solid fuel units, will be included in a subcategory for units combusting solid fuels for PM, Hg, and HCl.

3. Non-Continental Units

Comment: Commenters from affected island refineries and trade groups representing the petroleum and refining sectors requested additional fuel oil burning flexibility in this final rule and stated that work practice standards are more appropriate for fuel oil burning at refineries and other remote locations without access to natural gas.

Commenters also submitted technical issues justifying the creation of a non-continental or remote location subcategory. One commenter stated that most oil combustion in the petroleum sector is in locations that are islands or in more remote parts of the United States. Island and remote facilities cannot physically access natural gas pipelines, making burning liquid fuels unavoidable. The option of crude oil shipments would be impractical because the ships are limited by size and what is manageable by load/discharge ports. The commenter also claims that in the time it would take a crude ship to arrive, the refinery would have produced the amount of crude in the shipment. Further, while some units at a facility are designed to burn refinery fuel gas, the fuel gas produced at a refinery is less than the energy required to operate the refinery. These non-continental facilities are also limited to the fuel quality provided by their nearby crude slate used in the refining process. That commenter goes on to say that these refineries produce their fuel, the HAP metals content of the fuel used (particularly residual fuel oil) is a direct result of the crude slate used on site. The commenter submitted trace metals from various crudes to show that the content varies substantially between crude oils being used on site.

Another commenter provided the following distinctions for non-continental units: A striking example of fuel system differences for non-continental units is daily variation in fuel gas production due to ambient temperature fluctuations between night and mid-day or resulting from tropical rainfall events, coupled with fin fan cooling systems that are used because of the lack of fresh water available in an island without freshwater lakes or streams. The fuel system experiences a large daily variation in refinery fuel gas due to changes in ambient air temperature. These changes occur as a day-night swing in the refinery or any time there is a significant rain storm. As the ambient air temperature decreases, the amount of propane, butane and heavier molecules in the fuel gas decreases, as those compounds condense out. This results in a change in volume and composition (energy content) of the refinery fuel gas produced which, in the case of rainfall events, occurs very quickly and unpredictably. This temperature variation occurs more frequently than at a mainland refinery because: The method of cooling on gas compressors and distillation column overheads systems is ambient air fin fan coolers (water with cooling towers is not used like a stateside refinery because fresh water is not available other than by desalination); the refinery fuel gas system contains miles of aboveground piping (long lines are affected by rain and weather conditions); refinery fuel gas contains more propane and butane than would natural gas from a pipeline (which condense at closer to ambient temperatures than methane or ethane); the make-up fuel system for the refinery is not a natural gas pipeline as at a stateside refinery. A natural gas pipeline can handle changes in refinery fuel gas produced because natural gas delivery systems are usually large enough to handle changes. A temperature change of 10 to 15 degrees or a rain storm that quickly wets the air fin fans/piping will change the volume and composition (energy content) of the refinery fuel gas produced and also impacts CO emissions.

In addition to the technical limitations described above, one commenter cited other EPA air regulations that have provided separate standards or subcategories for non-continental units. For example, 40 CFR part 60 subparts Db and KKKK include separate standards for "non-continental" units and the 2010 CISWI proposal had a subcategory for smaller remote facilities because of inherent design and operating constraints.

Another commenter mentions that the inability to obtain natural gas removes the option of being able to burn only gaseous fuels as a compliance strategy and burning fuel oil as a supplemental fuel makes complying with this proposed MACT unfairly onerous.

Response: EPA agrees that the unique considerations faced by non-continental refineries warrant a separate subcategory for these units. However, data were only provided for CO and Hg, and, in the absence of data for the other pollutants, EPA is adopting the same limits that were developed for liquid units, because liquid units are the most similar units for which data are available. EPA assumed that while the commenter focused on changes in refinery gas, that the commenters concern was with liquid fuel-fired units whose performance is impacted by the co-firing of refinery gas. Regardless, it is clear that the unique design of this type of unit warrants a separate subcategory because design constraints would not enable the sources to meet the same standards, particularly for CO, as stateside units.

4. Combination Fuel Units

Comment: Several industries and industry representatives in addition to some State and local governments argued that combination fuel units are significantly different from units in single fuel subcategories. These commenters focused on three types of combination fuel units. The first, which the majority of comments focused on, was biomass and coal co-fired units. Commenters stated that classifying units that burned 90 percent biomass in the coal subcategory if it fired at least 10 percent heat input coal penalizes and discourages the use of biomass. One commenter claimed that they were unaware of any available control technology with the capability of reducing emissions from its biomass-fired boilers from their current levels to the level proposed for the coal stoker subcategory. Commenters stated that in order to meet the organic HAP limits for coal, they would have to switch from biomass to more coal or abandon co-firing projects. According to the commenter this result was contrary to state Renewable Portfolio Standards and general national renewable energy policy.

The second type of combination unit commenters discussed was units that co-fire gas and liquid fuels. Many commenters argued that combination oil and gas fired units are of a completely different design than EPA contemplated in setting its standards and cannot be fairly included in the same subcategory with other dedicated gas or oil fired units. Commenters elaborated that the main design difference was due to combustion techniques which require the heater/boiler firebox configuration to compromise between the needs of oil fuel and gas fuel, making it impossible to maximize combustion efficiency or minimize NO_X emissions. Commenters also noted that these units were not considered in development of the MACT standards, and claimed that they are well known in the burner industry and referenced in standard literature.

The third type of combination unit, one commenter mentioned, was a subcategory for units co-firing biomass with any solid fuel. Commenters claimed that by failing to recognize the wide verity of fuel inputs and thus the variation in fuel quality (i.e., BTU and moisture content) and emissions, EPA was penalizing facilities that use multiple fuel streams. The commenter went on to request that EPA establish emission limits that reflect the variation in fuels and fuel quality in these combination units.

Several commenters disagreed with the EPA statement that boilers are designed to burn only one fuel and that unit will encounter operational problems if another fuel type is fired at more than 10 percent heat input. Commenters stated that some boilers are specifically designed to burn a combination of fuels, and to burn them in varying quantities. Commenters elaborated that such boilers are not able to reach full load on any single fuel and that EPA has incorrectly presumed that all boilers are designed based on a primary fuel. Some commenters identified that many of the boilers used as the basis of the proposed MACT floor emission limits co-fire different fuel types. One commenter stated that if most units are designed to burn a primary fuel and will encounter problems if the 10 percent threshold is exceeded, then EPA has proposed MACT standards that will apply to boilers that by their nature are "encountering problems" due to their fuel mix. The commenter requested that EPA addresses this inconsistency.

Many commenters noted that emissions profiles vary with the fuel which made it very difficult to establish a typical emissions profile. Commenters also explained that combination fuel boilers must often adapt to process steam demands and thus experience frequent load swings and fuel input adjustments that cause significant variation in CO emission levels. Commenters also mentioned that control compatibility should be considered for multi-fuel boilers because they have inherently different control needs depending on the fuels being fired. Commenters went on to say that current limits are based on control equipment that is optimized for one HAP or fuel but the affect of other HAP and fuels or even another control would result in unknown performance and compatibility with other fuel types.

Several commenters also had concerns regarding enforcement and compliance of combination fuel units. One commenter requested that EPA more specifically address the "enforceability" of the "designed to burn" classification and more clearly consider the implications of the multi-fuel boiler operation on testing considerations. Another commenter stated that expressing limits as applicable to units "designed to burn" certain fuels was problematic and should be changed to "permitted to burn" because a State permit could limit the type of fuels combusted at a unit that may have originally been designed to burn other fuel types. Other commenters claimed that the fuel subcategory should be determined by the actual quantity of fuel burned not what the unit is designed to burn. Some questions that commenters requested clarification on were: If compliance tests would be required under different fuel firing conditions, can units with CEMS switch limits depending on what fuel is being combusted, if "designed to combust" is not maintained would actual fuel burned or fuel the unit is permitted to burn determine the subcategory, what would the annual performance test be if in the middle of the year a unit goes from having burned only one type of fuel to only another type the rest of the year.

Several solutions were suggested for addressing combination boilers. Some commenters requested that combination boilers have their own subcategory. Several other industry commenters suggested that EPA modify the subcategory definitions and applicability so that combination fuel units burning more than 10 percent coal with biomass would be regulated under the coal subcategory for fuel-based HAP and units burning more than 10 percent biomass with coal would be regulated under the biomass subcategory for combustion-based HAP. A more general solution proposed, for all types of combination fuel units, was that if a facility combusts more than one fuel type, it must meet the lowest applicable emission limit for all of the fuel types actually burned. Some commenters also requested the development of a formula based approach similar to that of the boiler NSPS SO_2 limits that considers the mix of fuel fired rather than assuming one fuel dictates the emission limitations.

Some commenters were concerned that determination of MACT floor limits should be based only on data obtained while firing 100 percent of the affected fuel category and recommended that EPA either exclude all test runs where a unit was co-firing or adjust the data accordingly to remove the co-firing bias.

Response: In response to the variety of comments regarding combination fuel boilers, EPA has revised the subcategories in order to simplify implementation, improve the flexibility of units in establishing and changing fuel mixtures, promote combustion of cleaner fuels, and provide MACT standards that are enforceable and consistent with the requirements of section 112. For the combination liquid and gas-fired units, while the commenters provided some insights on these units, the data available to EPA regarding any distinctions between these units and units designed to burn liquid only were insufficient to provide a justification for changing the approach for these units. For combined fuel units that combust solid fuels, due to the many potential combinations and percentages of solid fuels that are or can be combusted, for the fuel-based pollutants, EPA selected the option of combining the subcategories for solid fuels into a single solid fuel subcategory. For the fuel-based pollutants, this alleviates the concerns regarding changes in fuel mixtures, promotion of combustion of dirtier fuels, and the implementation and compliance concerns. For combustion-based pollutants (CO and dioxin/furan), we maintained the proposed subcategories and added a few additional subcategories, as discussed elsewhere in this preamble, based on public comment. One change we are finalizing is that to determine the appropriate subcategory, instead of considering whether the unit is designed to combust at least 10 percent coal as the first step (as proposed), the first step in determining the appropriate subcategory is to consider the percentage of biomass that is combusted in the unit.

The subcategories for the combustion-based pollutants are now determined in the following manner. If your new or existing boiler or process heater burns at least 10 percent biomass on an annual average heat input basis, the unit is in one of the biomass subcategories. If your new or existing boiler or process heater burns at least 10 percent coal and less than 10 percent biomass, on an annual average heat input basis, the unit is in one of the coal subcategories. If your facility is located in the continental United States and your new or existing boiler or process heater burns at least 10 percent liquid fuel (such as distillate oil, residual oil) and less than 10 percent coal and less than 10 percent biomass, on an annual average heat input basis, your unit is in the liquid subcategory. If your non-continental new or existing boiler or process heater burns at least 10 percent liquid fuel (such as distillate oil, residual oil) and less than 10 percent coal and less than 10 percent biomass, on an annual average heat input basis, your unit is in the non-continental liquid subcategory. Finally, for the combustion-based pollutants, if your unit combusts gaseous fuel that does not qualify as a "Gas 1" fuel, your unit is in the Gas 2 subcategory.

D. Work Practices

1. Gas 1 Work Practices

Comment: Several industry and industry trade group commenters expressed general support for the adoption of work practice standards for natural gas and refinery gas (Gas 1) fired boilers and process heaters. Many of these commenters stated that work practice standards will minimize HAP emissions in a cost effective manner.

Commenters, including industry representatives and one government agency, submitted several technical justifications that supported the proposed work practice standards for natural gas and refinery gas units. Many of these commenters stated that Gas 1 units contribute a negligible amount of the total emissions from the source category. One commenter stated that based on a review of air permits issued for natural gas-fired units over the last 10 years no HAP emissions were identified at rates which required the State to set emission limits. Further, many commenters indicated that no currently-available control technology or technique has been indentified to achieve numeric limits for natural gas units. Others went on to argue that tune-ups actually represent the only "floor" technology currently in use at boilers and process heaters in the Gas 1 subcategory. One commenter stated that design characteristics of these units, and hence the emissions-reduction potentials of annual tune-ups, vary widely and no single emission rate or even percentage of emission reduction could be translated into a numerical limit.

Several commenters argued that work practice standards were justified based on the technical infeasibility of emissions testing and the accuracy of testing results from gas units. These commenters stated that most of the emission test data were close to detection limits or in some cases indistinguishable from ambient air near the lowest detect levels, thus preventing the limits from being enforced or reliably measured. Others argued that the application of EPA test methods to measure emissions from natural gas units results in unreliable data given that the emissions are low and below what the test methods can detect, causing repeat tests or significantly lengthening the periods for the tests, which in turn increase the cost of testing.

On the contrary, one of the environmental advocacy group commenters stated that EPA exempted natural gas-fired units from CO limits without any discussion or analysis. This commenter argued that nothing in the rulemaking docket showed that measurement would be technically infeasible and identified CO emission test results from over 160 natural gas-fired units in the NACAA database. Further, the commenter suggested that federal, State and local authorities have routinely required CO to be measured at gas fired units since CO is a criteria pollutant under the CAA.

In addition to technical reasoning, many industry and industry representative commenters also supported the adoption of work practice standards on the basis of legal precedent and authority under the CAA. Commenters stated that EPA derives its authority to use work practices in lieu of numeric emission limitations from two different statutory provisions: The narrowly construed provisions of 112(h) and the broad authority under 112(d) as defined in section 302(k). Additionally, one commenter stated that work practice standards for Gas 1 units are consistent with the D.C. Circuit's opinion in *Sierra Club v. EPA* on the Brick MACT standard, which provided guidance on the criteria EPA must meet to justify the application of section 112(h) work practices, only if measuring emission levels is technologically or economically impracticable.

Many commenters also cited economic justifications supporting the proposed work practices for Gas 1 units. These comments included claims that work practice standards avoid economic harm to the manufacturing sector, and they added that the cost to control each unit would be extremely burdensome with minimal benefits to the environment. These commenters suggested that any type of control beyond a tune-up would be a beyond-the-floor option and the complex controls needed to achieve such low emission levels would fail the cost-benefit determination needed to justify a beyond-the-floor option.

On the contrary, two environmental advocacy groups submitted comments opposing EPA's rationale for exempting Gas 1 units from CO limits on the basis of cost. The commenters argued that the only economic defense of work practice standards that would be justified was if economic limitations rendered the measurement of emissions "impracticable." Further, the commenters suggested that many of these Gas 1 units would require more than a tune-up to achieve comparable reductions to those estimated if a numeric MACT floor standard was required.

Another commenter representing the coal industry also disagreed with EPA's use of a public policy rationale to justify a work practice for Gas 1 units instead of demonstrating that a work practice meets the requirements under section 112(h). The commenter argued that cost considerations were not relevant in a MACT floor analysis and they noted that the per unit costs of complying with MACT standards for gas units are lower than the cost for coal units.

Many commenters from industry, industry trade groups, universities, and State agencies agreed that emission limits would provide a disincentive to operate or switch to natural gas and refinery gas fired units. Commenters claimed that if limits for Gas 1 were adopted, units would switch from natural gas to electric systems powered by coal. Commenters stated that EPA correctly concluded that imposing emission limitations on gas-fired boilers would create a disincentive for switching to gas from oil, coal, or biomass as a control technique and would create an incentive for facilities to switch away from gas to other fuels.

A commenter from a private coal company indicated that EPA's concerns that establishing a MACT floor limit for Gas 1 units would incentivize fuel switching to coal or other fuels contradict EPA's rejection of fuel switching as a MACT floor alternative. The commenter added that if EPA rejected fuel switching because of its costliness and lack of a net emissions benefit, EPA should want to discourage coal units from converting to natural gas rather than promoting fuel switching to natural gas. This commenter also claimed that establishing a work practice standard for only Gas 1 units discriminated in favor of the use of natural gas and against the use of coal. The commenter argued that such a policy rationale invokes considerations that are not relevant in setting MACT floor standards and suggested that such a rationale is in violation of both CAA and the Equal Protection Clause of the Constitution. This commenter added that the only relevant statutory factor under 112(h) to help EPA determine where to apply a work practice standard was whether the hazardous air pollutant cannot be emitted through a conveyance designed and constructed to emit or capture that pollutant, whether the use of such a conveyance would be inconsistent with law, or whether the application of measurement methodology is not practicable due to technological and economic limitations.

Comprehensive Application Report for 8200152.14B

11/17/2014

Enviva Pellets Sampson, LLC - Faison (8200152)

Sampson County

General Information:	Permit/Latest Revision: 10386/ R00
Permit code:	PSD
Application type:	Greenfield Facility
Engineer/Rev. location:	Kevin Godwin/RCO
Regional Contact:	Gregory Reeves
Facility location:	Fayetteville Regional Office
Facility classification:	Title V
Clock is ON	Application is COMPLETE
Status is :	Issued

Application Dates

Received	Completeness Due	Clock Start	Calculated Issue Due
05/05/2014	06/04/2014	05/05/2014	

Fee Information

Initial amount:	Date received:	Amount Due:	Add. Amt Rcv'd:	Date Rcv'd:
$0.00	05/05/2014	0.00		

Fund type:	Deposit Slip #:	Location rec'd:	Location deposited:
2333			

Contact Information

Type	Name	Address	City State ZIP	Telephone
Authorized	Michael Doniger, Director Plant Operations	7200 Wisconsin Avenue	Bethesda, MD 20814	(804) 929-8418
Technical/Permit	Joe Harrell, EHS Manager	142 NC Route 561 East	Ahoskie, NC 27910	(252) 209-6032

Acceptance Criteria

Received?	Acceptance Criteria Description
Yes	Application fee
Yes	Appropriate number of apps submitted
Yes	Zoning Addressed
Yes	Source recycling/reduction form
Yes	Authorized signature
Yes	PE Seal
Yes	Application contains toxic modification(s)

Completeness Criteria

Received?	Complete Item Description

Comprehensive Application Report for 8200152.14B 11/17/2014

Enviva Pellets Sampson, LLC - Faison (8200152)

Sampson County

Application Events

Event	Start	Due	Complete	Comments	Staff
TV - Acknowledgment/Complete	05/05/2014	05/15/2014	05/15/2014	($13,837 fee submitted with 09/12/13 application)	cjhepp
Application amendment received	06/18/2014		06/18/2014	revised BACT include GHG	kgodwin
Technical additional information request	06/24/2014	07/24/2014	07/21/2014		kgodwin
Application amendment received	09/03/2014		09/03/2014		kgodwin
Draft to coordinator/supervisor for review	09/19/2014		09/22/2014		kgodwin
Public notice sent to county manager	09/26/2014		09/26/2014		kmhash
Public notice published	09/29/2014		10/29/2014	Fayetteville Observer	kmhash
Permit issued	11/17/2014		11/17/2014		kmhash

Comprehensive Application Report for 8200152.14B

Enviva Pellets Sampson, LLC - Faison (8200152)

Sampson County

Outcome Information

Class before: Unknown   Class after: Title V

2Q .0711: No   2D .1100: No

NSPS: Yes   NESHAPS/MACT: Yes   PSD/NSR: Yes

PSD/NSR Avoid: No   Prohibitory Small: No

PSD/NSR Status After: Major   General permit: No

Multi-site permit: No   Multi. permits at facility: No

Quarry permit: No   HAP Major (10/25 tpy): Major

2Q .0705 Last MACT/Toxics: NO   NESHAPS/GACT: NO

New Source RACT/LAER: NO   Existing Source RACT: NO

RACT/LAER Added Fee: NO   RACT Avoidance: NO

2Q .0702 (a)(18) - Toxics/Combustion Source(s) After 07/10/10: NO

Permit/Revision: 10386/R00

Revision Issue Date: 11/17/2014

Accumulated process days (includes public notice periods): 168

Public notice/hearing/add info after 80 days:

Manager's discretion: Appealed? No

Current Permit Information:

Issue	Effective	Expiration	Revision #
11/17/2014	11/17/2014	10/31/2019	R00

Regulations Pertaining to this Permit

Reference Rule		Regulation Description
2D	.0515	Particulates Miscellaneous Industrial Processes
2D	.0516	Sulfur Dioxide Emissions Combustion Sources
2D	.0521	Control of Visible Emissions

Audit Information Pertaining to this Application

Column Name	Date Changed	Old Value	New Value	Editor
permit_No	05/15/2014		10386	Connie Horne

ENVIVA PELLETS SAMPSON, LLC • SAMPSON COUNTY, NORTH CAROLINA

REVISED PSD AIR QUALITY CONSTRUCTION AND OPERATING PERMIT APPLICATION

Prepared By:

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August 2014

Project 143401.0031

Environmental solutions delivered uncommonly well

SECTION 1
INTRODUCTION

1. INTRODUCTION

Enviva Pellets Sampson, LLC (Enviva) is planning to construct and operate a wood pellets manufacturing plant in Sampson County, NC. The proposed wood pellets plant is designed to produce up to 537,625 oven-dried tons (ODT) per year of wood pellets utilizing up to 75% softwood on a 12-month rolling total basis. The proposed plant consists of log chipper, green wood hammermill, bark hog, 250.4 MMBtu/hr dryer, hammermills, pellet presses and coolers, production loading operations and other ancillary activities described in detail in Section 2.0. Construction of the facility is anticipated to begin in late 2014.

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 carbon dioxide, 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) and the Programme for the Endorsement of Forest Certifications (PEFC). 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.

1.1. REGULATORY APPLICABILITY

This document comprises an air quality construction and operating permit application for the project. The proposed project triggers PSD review as a result of a new major source of volatile organic compounds (VOCs), and with potential emissions from the project exceeding the PSD Significant Emission Rates (SERs) for carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter (PM, also called total suspended particulate [TSP]), and particulate matter less than 10 and 2.5 microns in aerodynamic diameter (PM_{10} and $PM_{2.5}$). For each pollutant that is major and exceeds PSD SER, an evaluation of Best Available Control Technology (BACT) to reduce emissions is provided.

Air quality modeling analyses are required for criteria pollutants subject to PSD review, as well as modeling for certain toxic air pollutants (TAPs) in accordance with relevant North Carolina Division of Air Quality's (NC DAQ's) regulations. This application conforms to all permitting requirements and demonstrates that the proposed facility will operate in accordance with those requirements. It should be noted that the project will not cause or contribute to violations of the National and State Ambient Air Quality Standards (NAAQS and SAAQS) and PSD Increments, will not result in adverse impacts to federally protected Class I areas, and will utilize Best Available Control Technology (BACT) for each compound subject to PSD review. In addition to the major regulatory requirements highlighted above, this permitting action will trigger several other state requirements addressed in this application.

1.2. BACT DETERMINATION

Enviva performed BACT analyses for each of the PSD-regulated pollutants and emission units subject to PSD review following the "top-down" approach required by U.S. EPA. The top-down process begins by ranking all potentially relevant control technologies in descending order of control effectiveness. The most stringent or "top" control option is identified as BACT unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option does not meet the definition of BACT. Where the top option is not determined to be BACT, the next most stringent alternative is evaluated in the same manner. This process continues until BACT is determined. BACT evaluations are provided in Section 4 of this report.

1.3. AIR QUALITY ANALYSIS

The air dispersion modeling and other air quality analyses required under PSD are provided in Section 5 of this report. Following NCDAQ policy, Trinity Consultants (Trinity), on behalf of Enviva, submitted a dispersion modeling protocol describing the proposed methodologies and data resources for the project.[1] The protocol included a description of the proposed facility, an overview of the required PSD and State-only modeling analyses, and a description of the methodology proposed to be used in those modeling analyses. The analyses discussed included evaluations of National Ambient Air Quality Standards (NAAQS), PSD Increment, additional impacts analyses for visibility and non-air quality impacts, as well as the ambient impact assessment of toxic air pollutant (TAP) emissions. The protocol was approved by NCDAQ, with limited comments, on August 13, 2013.[2]

The modeling analyses demonstrate that the project will not cause or contribute to an exceedance of any National Ambient Air Quality Standards (NAAQS) or Class II PSD Increment requirements. An additional impacts analysis is also included in Section 6.

1.4. APPLICATION ORGANIZATION

Six copies of the application have been provided. The permit processing fee was previously submitted with the original application. This application is comprised of the following:

- Section 1 provides an Executive Summary,
- Section 2 provides a project description and discusses air emissions,
- Section 3 discusses regulatory applicability,
- Section 4 summarizes the BACT analysis,
- Section 5 summarizes the air dispersion modeling analysis,
- Section 6 summarizes additional impacts as required by PSD,
- Appendix A contains air permit application forms,
- Appendix B presents air emissions calculations,
- Appendix C contains the required local zoning consistency determination,
- Appendix D contains BACT tables,
- Appendix E contains modeling plots,
- Appendix F contains a PSD modeling flowchart,
- Appendix G contains the regional source inventory,
- Appendix H contains the electronic modeling files, and
- Appendix I contains the Enviva dryer letter.

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[1] Letter from Jonathan Hill (Trinity) to Mark Cuilla (NCDAQ) dated August 6, 2013.
[2] Letter from Tom Anderson (NCDAQ) to Jonathan Hill (Trinity) dated August 13, 2013.

SECTION 2
PROCESS DESCRIPTION & AIR EMISSIONS

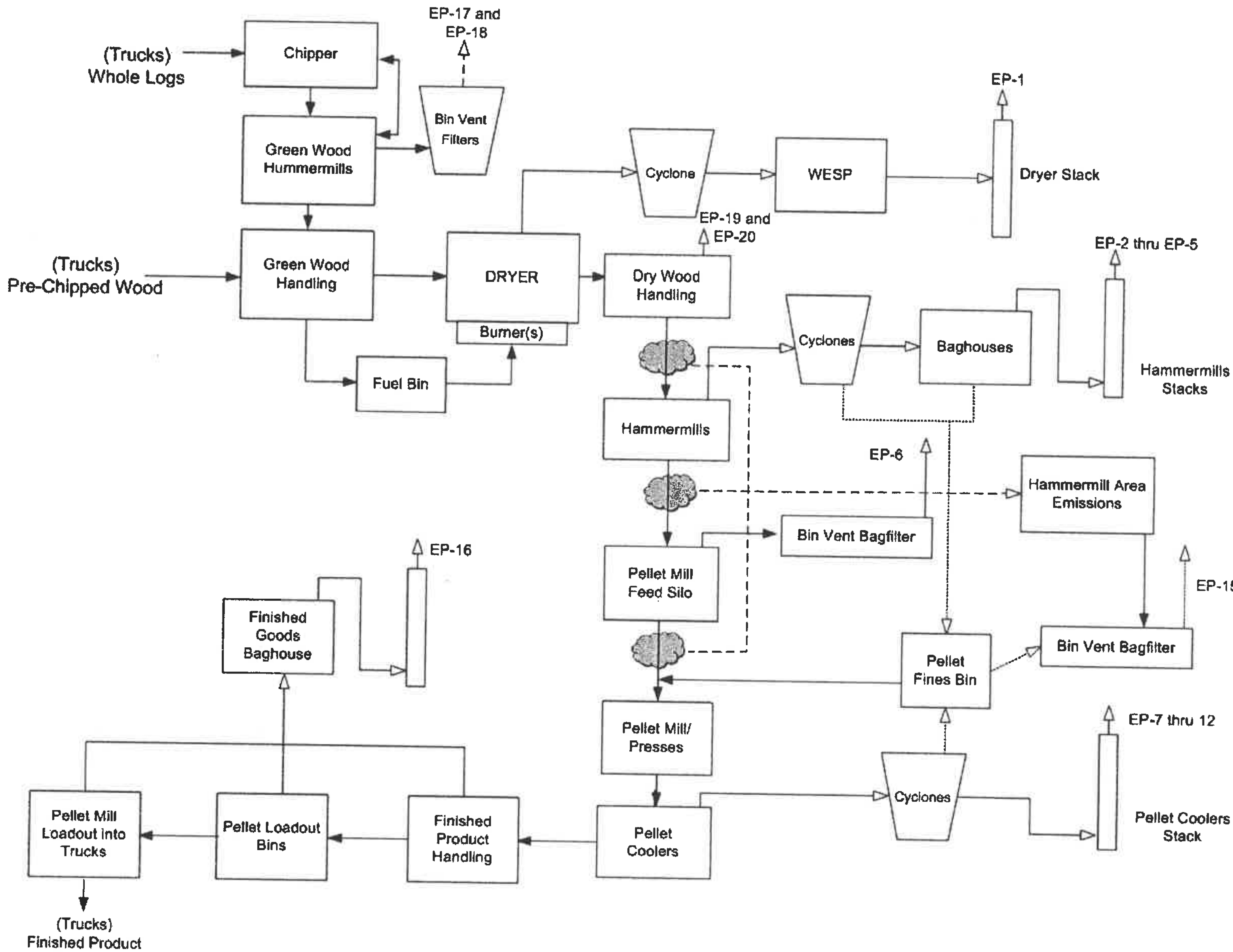
2. PROCESS DESCRIPTION AND AIR EMISSIONS

The proposed wood pellets plant is designed to produce up to 537,625 oven-dried tons (ODT) per year of wood pellets utilizing up to 75% softwood on a 12-month rolling total basis. This section discusses the Sampson Plant's pelletizing process and associated air emissions for the proposed plant, which consists of the following:

- Green wood handling and sizing operations;
- Green wood fuel storage bin;
- Log debarker;
- Log bark hog;
- Log chipper;
- Two (2) green wood hammermills controlled by bin vent filters;
- Eight (8) dry wood hammermills controlled by eight cyclones and eight fabric filtration systems;
- Hammermill area emissions controlled by the pellet fines bin bin vent filter;
- A pellet mill feed silo controlled by bin vent filter;
- Twelve (12) wood pellet presses and six (6) pellet coolers controlled via cyclones;
- One 250.4 MMBtu/hr green wood direct-fired dryer system with pollution control equipment consisting of a three simple cyclones and a wet electrostatic precipitator (WESP) for particulate matter abatement;
- Finished product storage and loading controlled by a fabric filter;
- Pellet fines bin controlled via a bin vent filter;
- Dried wood handling operations;
- Three (3) diesel storage tanks;
- Emergency electric generator; and
- Fire water pump.

Detailed air emissions calculations are presented for each source discussed in this section in Appendix B. A process flow diagram is presented in Figure 2-1.

Figure 2-1. Process Flow Diagram



2.1. GREEN WOOD HANDLING AND SIZING, FUEL STORAGE BIN, AND STORAGE PILES

"Green" (i.e., wet) wood will be delivered to the facility via trucks as either pre-chipped wood or unchipped low grade wood fiber; tops, limbs, and logs from commercial thinning for on-site chipping. Pre-chipped wood will be screened and oversized chips will undergo additional chipping. Unchipped wood will be debarked and chipped to specification for drying in the on-site electric-powered debarker (IES-DEBARK-1), chipper (ES-CHP), and two green wood hammermills (ES-GHM-1, ES-GHM-2) as required. Chipped wood for drying is conveyed to a chipped wood storage pile while bark is conveyed to a bark fuel storage pile (IES-GWFB).

Green wood and bark contains a high moisture content approaching 50 percent by weight. Therefore, green wood handling and sizing, fuel storage bin, and storage piles have negligible emissions and are included on the insignificant activities list. Representative drop point emission calculations using AP-42 Section 13.2.3 for Aggregate Handling are attached in Appendix B for green wood handling and sizing to demonstrate that these emissions are negligible.

Fugitive particulate emissions from chipped wood storage piles are quantified in Appendix B. Emission factors are developed based on the surface area of the piles in accordance with U.S. EPA guidance for active storage pile fugitive emissions.[3] These factors provide estimates of PM emissions due to wind erosion at the surface of each storage pile based on the annual frequency of high wind speeds (> 12 mph).

In addition to particulate matter emissions, volatile organic compounds are also emitted from the storage pile. Emission factors are obtained from a National Council for Air and Stream Improvement (NCASI) document provided by SC DHEC for the calculation of fugitive VOC emissions from woody biomass storage piles. Emission factors ranged from 1.6 to 3.6 lb VOC as carbon/acre-day. Enviva chose to employ the maximum emission factor to be conservative. Emission factors are provided in pounds of carbon per surface area of the pile. Detailed calculations are included in Appendix B.

2.2. DEBARKING, CHIPPING, GREEN WOOD HAMMERMILLING, AND BARK HOG

Bark is removed from unchipped wood prior to chipping in rotary drum debarkers. There are no current AP-42 emission factors or other emission factors available for debarkers, and visual observations of these units in operation at other Enviva plants indicate that emissions are negligible due to the high moisture content of bark and the wind break provided by the drums.

Emission estimates for the chipper and bark hog are based on limited emission factors available for wood chipping. As shown in the attached emissions calculations (Appendix B), VOC emissions from these sources are calculated using emission factors from AP-42 Section 10.6.3 emission factors for hardwood chipping emissions. Methanol emissions are also calculated using factors from AP-42 Sections 10.6.3 and 10.6.4. Particulate matter (PM) emissions will be negligible from the chipper (ES-CHP) because the exhaust is directed downward towards the ground.

[3] U.S. EPA *Control of Open Fugitive Dust Sources*, Research Triangle Park, North Carolina, EPA-450/3-88-008. September 1988.

VOC emission estimates for the green wood hammermills (ES-GHM-1 and 2) are Enviva Wiggins stack test emission factors. PM emissions from the green wood hammermills will be controlled via bin vents. Particulate emissions from the green wood hammermills are based on air flow rate and a bin vent outlet particulate matter grain loading factor of 0.004 gr/ft3.

2.3. WOOD DRYER (ES-DRYER)

Green wood is conveyed to a single rotary dryer system. Direct contact heat is provided to the system via a 250.4 MMBtu/hr total heat input burner system using bark and wood chips as fuel. Air emissions are controlled by three identical simple cyclones to capture bulk particulate matter. Emissions from each of the cyclones are combined into a common duct and are routed to the wet electrostatic precipitator (WESP) for additional particulate, metal HAP, and hydrogen chloride removal.

Criteria pollutant emissions are calculated using a combination of AP-42 emission factors and existing stack testing results from Enviva's Ahoskie and Wiggins facilities. The reader should refer to detailed footnotes in Appendix B for details of the origin of each factor.

HAP and TAP emissions are calculated from combustion of wood in the dryer using AP-42 Section 1.6 and control of metal HAP emissions via the WESP. In addition to HAP and TAP emissions from combustion of wood in the dryer, HAPs and TAPs are also released during the drying of wood. Emission factors for green, direct wood-fired softwood are obtained from Enviva stack test data. Refer to Appendix B for a detailed description of the emission factors.

2.4. DRIED AND SIZED WOOD HANDLING (IES-DWH)

Dried materials are transferred from the dryer via conveyors to screening operations that remove smaller size wood particles prior to transfer into hammermills for further size reduction prior to pelletization. Smaller particles passing through the screens are diverted to the hammermill discharge conveyor, while oversized wood is diverted to the hammermills. Dust generated from transfer operations around the screening operation is diverted to the hammermill area filtration system, which is described in the following subsection. There are several other transfer points comprising an insignificant emission source designated as "IES-DWH", dried and sized wood handling, located between the dryer and hammermills that are completely enclosed with only two emission points that are controlled by bin vents. The bin vent particulate matter emissions are calculated using a manufacturer guaranteed grain loading factor for the wood particulates and the maximum nominal flow rate.

2.5. HAMMERMILLS (ES-HM-1 THROUGH 8)

Prior to pelletization, dried wood is reduced to the appropriate size needed using eight hammermills operating in parallel. A conveyor system receives the ground wood from the hammermills and sends it to the pellet mill feed silo.

Particulate emissions from each of the eight hammermills are controlled using eight individual cyclones, which are subsequently controlled by eight individual fabric filters. Appendix B summarizes the emissions from each hammermill bagfilter system. Particulate matter emissions from each bagfilter are calculated using a manufacturer guaranteed grain loading factor for the wood particulates and the maximum nominal stack flow rate.

VOC, HAP, and TAP emissions are calculated using Enviva stack testing information as shown in Appendix B.

2.6. HAMMERMILL AREA EMISSIONS (ES-HMA)

An induced draft fan is used to transfer dust generated from a number of enclosed transfer/handling sources around the hammermill to the pellet fines bin (CD-PFB-BV). Ssources controlled by the bagfilter on the pellet fines bin include, but are not limited to, the following:

- Hammermills infeed and distribution transfer;
- Hammermills cyclone and bagfilter drop out;
- Pellet cooler transfer (particulate emissions from pellet cooler cyclones large enough to drop out of entrainment) & pellet screening;
- Hammermill pre-screen feeder emissions;
- Pellet screen fines cyclone; and
- Pellet fines bin emissions.

Emissions from this bagfilter are calculated assuming a manufacturer guaranteed grain loading factor for the wood particulates and the maximum nominal stack flow rate.

2.7. PELLET MILL FEED SILO (ES-PMFS) AND PELLET MILL FINES BIN (ES-PFB)

Sized wood from the hammermills is transported on a set of conveyors to the pellet mill feed silo prior to pelletization. Particulate emissions from the pellet mill feed silo bin vent filter are calculated assuming a manufacturer guaranteed grain loading factor and the maximum nominal stack flow rate.

As described in Section 2.6, fine pellet material from the hammermill pollution control system and screening operation is collected in the pellet fines bin which is controlled by a bin vent baghouse. Particulate emissions from the baghouse are calculated assuming a manufacturer guaranteed grain loading factor and the maximum nominal stack flow rate.

2.8. PELLET PRESS SYSTEM PELLET COOLERS (ES-CLR-1 THROUGH 6)

Dried ground wood is mechanically compacted in the presence of water in several screw presses in the Pellet Press System. Exhaust from the Pellet Press System and Pellet Presses conveyors are vented through the cooler aspiration cyclones and then to the atmosphere, as shown in Appendix B. No chemical binding agents are needed for pelletization.

Formed pellets are discharged into one of six pellet coolers. 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 cyclones operating in parallel prior to discharge to the atmosphere.

Particulate matter emissions from each cyclone are calculated assuming a maximum grain loading factor for the wood particulates and the maximum nominal stack flow rate. VOC, HAP, and TAP emissions are calculated like the hammermills using stack testing data. Please see Appendix B for a detailed discussion.

2.9. FINISHED PRODUCT HANDLING AND LOADOUT

Final product is conveyed to four pellet truck loadout bins (PB-1, -2, -3, -4) that feed two pellet truck loadout operations (ES-PL-1, -2). Emissions from the Pellet Loadout Bins are controlled by a bagfilter. Pellet Loadout is accomplished by gravity feed of the pellets through a covered chute to reduce emissions. Emissions to the atmosphere from conveyance from the Pellet Loadout Bins are minimal because dried wood fines have been removed in the pellet screener, and a slight negative pressure is maintained in the loadout building as a fire prevention measure to prevent any buildup of dust on surfaces within the building. Slight negative pressure is produced via an induced draft fan that exhausts to the same bagfilter (CD-FPH) that controls minor dust emissions from loading of the Pellet Loadout Bins.

Particulate emissions from finished product handling and loadout are calculated assuming a manufacturer guaranteed grain loading factor and the maximum nominal stack flow rate for the bagfilter.

2.10. EMERGENCY GENERATOR AND FIRE WATER PUMP FUEL OIL STORAGE TANKS

The plant will utilize a 250 brake horsepower emergency generator for emergency operations and a 250 brake horsepower fire water pump engine. All engines will combust diesel fuel. Aside from maintenance and readiness testing, the generator and fire water pump engines will only be utilized for emergency operations. Diesel for the emergency generator will be stored in a storage tank of up to 2,500 gallons capacity and diesel for the fire water pump will be stored in a storage tank of up to 1,000 gallons capacity. Emissions from all fuel oil storage tanks are estimated to be 1.6 pounds per year. It is requested that these tanks be listed as insignificant sources in the permit.

SECTION 3
REGULATORY ANALYSIS

3. REGULATORY APPLICABILITY ANALYSIS

This section summarizes the applicability and requirements of key federal and state regulations.

3.1. FEDERAL REGULATIONS

3.1.1. Prevention of Significant Deterioration (PSD), 40 CFR Part 51.166

North Carolina implements the federal PSD requirements of 40 CFR 51.166 under North Carolina Regulation 15A NCAC 2D .0530. Under the PSD regulations, a major stationary source for PSD is defined as any source in one of the 28 named source categories with the potential to emit 100 tpy or more of any regulated pollutant, or any source not in one of the 28 named source categories with the potential to emit 250 tpy or more of any regulated pollutant other that GHGs.[4] Neither wood pellet production nor operation of associated combustion sources qualifies the facility for classification in one of the 28 listed source categories.

Federal PSD requirements for GHGs have been implemented in North Carolina under 15A NCAC 2D .0544, which essentially adopts the U.S. EPA's "GHG Tailoring Rule." As a result of the US Supreme Court Action on June 23, 2014 and EPA guidance issued on July 24, 2014, EPA and the state continue to evaluate large increases of GHGs at facilities that trigger PSD for other pollutants. The level for evaluating PSD review was suggested to be 75,000 tpy of CO_{2e}. As shown in Appendix B, Table B-1, the proposed project triggers PSD review for CO_2e, since potential GHG emissions exceed 75,000 tpy.

As shown in Appendix B, Table B-1 the proposed project constitutes a major stationary source of VOC. In addition, the facility triggers PSD review by virtue of exceeding the significant emission rates (SERs) for NO_x, CO, PM, PM_{10}, and $PM_{2.5}$. Therefore, Enviva is submitting this PSD construction and operating permit application in accordance with federal and state PSD requirements.

3.1.2. Title V Operating Permit Program, 40 CFR Part 70

40 CFR Part 70 establishes the federal Title V operating permit program. North Carolina has incorporated the provisions of this federal program in its Title V operating permit program under 15A NCAC 2Q .0500. The major source thresholds with respect to the North Carolina Title V operating permit program regulations are 10 tons per year of a single HAP, 25 tpy of any combination of HAP, and 100 tpy of certain other regulated pollutants.

The site will be a major Title V source for criteria and hazardous air pollutants as shown in Appendix B, Table B-1 and B-2. Enviva is requesting that the procedures of 15A NCAC 2Q .0504 be applied to this project allowing issuance of a construction and operating permit under 15A NCAC 2D .0300. Enviva will thereafter submit a permit application for a Title V permit within one year after commencement of operation.

[4] 40 CFR §57. 166(b)(1)(i)

3.1.3. New Source Performance Standards, 40 CFR Part 60 (15A NCAC 2D .0524 New Source Performance Standards)

New Source Performance Standards (NSPS), located in 40 CFR Part 60 and implemented in North Carolina Regulation 15A NCAC 2D .0524, require certain categories of new, modified, or reconstructed sources to control emissions to specified levels. Three potentially applicable NSPS are addressed below. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, unless specifically excluded.

3.1.3.1. NSPS Subpart IIII

NSPS Subpart IIII applies to owners or operators of compression ignition (CI) internal combustion engines (ICE) manufactured after April 1, 2006 that are not fire pump engines, and fire pump engines manufactured after July 1, 2006. As noted in Section 2, the plant will have a 250 hp emergency generator and a 250 hp emergency fire pump. The emergency generator and fire pump are subject to the provisions of NSPS Subpart IIII.

Under NSPS Subpart IIII, owners and operators of emergency generators manufactured in CY 2007 or later with a maximum engine power greater than or equal to 50 hp are required to comply with the emission limits referenced in 40 CFR §60.4205(b). These limits are as follows: 0.20 g/kW for PM, 3.5 g/kW for CO, and 4 g/kW for NO_x + nonmethane hydrocarbons (NMHC).

Enviva will comply with applicable emission limits by operating the emergency generator and fire water pump as instructed in the manufacturer's operating manual in accordance with 40 CFR §60.4211(a), and purchasing an engine certified to meet the referenced emission limits in accordance with 40 CFR §60.4211(c). The engine will be equipped with a non-resettable hour meter in accordance with 40 CFR §60.4209(a). Emergency and readiness testing of the unit will be limited to 100 hours per year.

In accordance with NSPS Subpart IIII, owners and operators of fire pump engines manufactured after July 1, 2006 must comply with the emission limits in Table 4 of NSPS Subpart IIII, which are organized based on the size of the unit. These limits are as follows: 0.20 g/kW for PM, 3.5 g/kW for CO, and 4 g/kW for NO_x + nonmethane hydrocarbons (NMHC).

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

Both the proposed emergency generator and fire pump will be required to comply with the fuel requirements in 40 CFR §60.4175.3, which limit sulfur to a maximum of 15 ppmw and a cetane index of at least 40.

3.1.3.2. NSPS Subpart Kb

NSPS Subpart Kb, *Standards of Performance for Volatile Organic Liquid Storage Vessels*, regulates storage vessels with a capacity greater than 75 cubic meters (m^3) (19,813 gallons) that are used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984.[5]

Diesel fuel oil storage tank capacities are well below the NSPS Subpart Kb storage capacity threshold of 19,813 gallons.

3.1.3.3. NSPS Subpart Db

The proposed plant will utilize direct fired drying of chipped wood and, therefore, will not trigger the NSPS Subpart Db (Industrial-Commercial-Institutional Steam Generating Units) regulations.

3.1.4. National Emission Standards for Hazardous Air Pollutants for Regulated Source Categories, 40 CFR Part 63 (15A NCAC 2D .1111 Maximum Achievable Control Technology)

National Emission Standards for Hazardous Air Pollutants (NESHAP) are listed in 40 CFR Part 63 and implemented via North Carolina regulation 15A NCAC 2D .1111. One potentially applicable NESHAP is addressed below.

3.1.4.1. 40 CFR Part 63 Subpart ZZZZ

40 CFR 63 Subpart ZZZZ applies to reciprocating internal combustion engines (RICE) located at a major or area source of HAP emissions. Emergency power and limited use units are subject to requirements under 40 CFR 63.6590(b)(i) and 40 CFR 63.6590(b)(ii). Emergency stationary RICE are defined in 40 CFR 63.6675 as any stationary RICE that operates in an emergency situation. These situations include engines used for power generation when power from the local utility is interrupted, or when engines are used to pump water in the case of fire or flood.

The proposed emergency generator and the emergency fire pump at the site will be classified as emergency stationary RICE under the NESHAP and will comply with the requirements listed under this subpart by complying with NSPS IIII.

3.1.5. National Emissions Standards for Hazardous Air Pollutants, Case-by-Case MACT for New and Reconstructed Major Stationary Sources, 40 CFR Part 63 Subpart B (15A NCAC 2D .1112 112(g) Case-by-Case Maximum Achievable Control Technology)

3.1.5.1. Statutory Background and Applicability to Project

Potential HAP emissions from the proposed facility will exceed the major stationary source threshold. Section 112(g) of the Clean Air Act requires that any new stationary source that is not a regulated "source category" for which a NESHAP has been establish must control emissions to levels that reflect "maximum achievable control technology" (MACT). Wood Pellet Manufacturing Plants are not a regulated source category; therefore, the project triggers 112(g) requirements.

Section 112(d)(3) describes MACT for new sources as follows:

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[5] 40 CFR 60.110b(a)

The maximum degree of reduction in emissions that is deemed achievable for new sources in a category or subcategory shall not be less stringent than the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator.

3.1.5.2. Overview of Other Wood Pellet Manufacturing Plants

Enviva is aware of only three (3) of the approximately 140 wood pellet manufacturing facilities in the U.S. that utilize controls on wood drying operations to reduce VOC and HAP emissions. There are no facilities in the U.S. that currently control sources of HAP emissions other than the dryer at pellet manufacturing facilities (e.g., dry wood hammermills, pellet presses, etc.).[6] A description of the three facilities using controls is provided below:

1. Georgia Biomass, located in Waycross, GA, employs a regenerative thermal oxidizer (RTO) on two 47 oven dried ton per hour (ODT/hr) single-pass rotary dryers. The facility utilizes 100% softwood for pellet production, drying wood chips from 50% to 10% moisture. The inlet peak temperatures of dryer air contacting the wood pellets is at least 950 oF with a dryer outlet temperature of greater than 300 oF.

2. Florida Green Circle, located in Jackson County, FL, operates an RTO on two 35 ODT/hr (nominal) single-pass dryers. The facility utilizes 100% softwood for pellet production, drying chips from a nominal 50% moisture to 9% moisture. The inlet peak temperatures of dryer air contacting the wood pellets is approximately 950 oF with a dryer outlet temperature of greater than 300 oF.

3. German Pellets Texas, located in Woodville, TX, operates an RTO on two 36 ODT/hr (nominal) single-pass dryers. The facility utilizes 100% softwood for pellet production, drying green wood sawdust from 56% moisture to approximately 11% moisture. The peak inlet temperature is at least 900°F with an outlet temperature of approximately 340 °F.

3.1.5.3. Proposed Enviva Sampson Drying System

In July 2014, Enviva selected TSI as the vendor for the dryer at the Sampson facility. TSI's single-pass rotary drying system is an inherently lower-emitting system that employs innovative drying techniques. The TSI design allows the vendor to guarantee significantly lower emissions from the dryer when compared to competitors, while also producing an improved product. The specifics of the TSI dryer design were forwarded to William Willets, Air Permits Chief, on July 16, 2014. A copy of the Enviva letter and the June 16, 2014 TSI letter are included in Appendix I.

3.1.5.4. Variables Impacting Organic HAP Emissions from Wood Drying

The primary variables impacting VOC emissions from drying are as follows:

1. Wood particle size – The degree to which wood is milled prior to drying can drastically increase wood surface area. Smaller particle sizes have higher surface area and are easier to dry.

2. Temperature – Inlet and outlet temperatures (as well as temperature along the entire dryer drum) significantly impact VOC and HAP emissions. VOC and HAP emissions increase with increased drying temperature.

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[6] 2013 US and Canada Pellet Mill Map at the International Biomass Conference & Expo by BBI International.

3. Outlet moisture content of wood – VOC emissions are highly dependent upon outlet moisture content of the wood being dried. Based on a review of a variety of forest products industries, it has been observed that VOC emissions are a *highly non-linear function* of final moisture content such that variability of moisture content by only a few percent are believed to have a considerable impact on VOC emissions. It is believed that HAP emissions also trend with outlet moisture content.

3.1.5.5. Distinguishing Characteristics of the Proposed Drying System

There are notable differences between Enviva's proposed drying process/technology and its competitors using RTOs with respect to each of the three factors that impact HAP emissions. Each factor is discussed below.

1. Wood chip size – Enviva will be reducing the size of wood chips fed to its drying system to one quarter inch to three eighths inch as measured by a square sieve. Detailed information regarding Green Circle's and Georgia Biomass' chip sizes is not known; however, German Pellets utilizes sawdust in its process, which is much finer and has a far greater surface area.

2. Temperature – Enviva's systems utilize a considerably lower temperature drying regime along the entire drum length than its competitors. Information regarding drying temperatures is provided in Section 3.1.5.2.

3. Outlet moisture content – Enviva will be drying wood to only 15% or higher moisture, which allows its product to be pelletized without any steaming or "conditioning' of the wood in the pelletizers. This is a higher moisture content than its competitors, which dry to lower levels that impact the properties of the wood and thereafter require steaming to manufacture on-specification product.

3.1.5.6. Proposed MACT for Drying System

Enviva's drying and high-moisture pelletization process reduces uncontrolled emissions to levels significantly below that of its competitors that have installed RTO controls. These differences justify the classification of Enviva's process drying and pellitization process as a separate subcategory, not dependent upon use of RTO control technology to reduce VOC/HAP emissions.

The Boiler NESHAP for major stationary sources is just one example of numerous NESHAP regulations promulgated by EPA that have established subcategories for regulated process units. For biomass combustion boilers alone, EPA established seven (7) different subcategories under the Boiler NESHAP with highly variable emission standards, many of which are established at levels so high that pollution controls will be unnecessary to achieve compliance.

Accordingly, Enviva proposes to minimize HAP emissions consistent with CAA Section 112(d)(2)(A) and (D), which provide for establishing MACT based on the use of lower emitting materials (i.e., limitation on softwood) and process design, respectively. No numerical emission rate limits are proposed.

Minor metal and inorganic HAP emissions associated with combustion of wood fuel in the dryer furnace system will be well-controlled using the pellet manufacturing industry standard of a wet electrostatic precipitator (WESP) proposed for the project. Other EPA standards such as the Plywood and Composite Wood Products (PCWP) NESHAP have recognized that combustion emissions from direct-fired drying operations are well-controlled with a WESP. Therefore, Enviva is not proposing any separate emission or operational standards for metal and inorganic HAP emissions from wood combustion in the dryer furnace system.

3.1.5.7. *MACT for Other Process Sources*

Other minor sources of HAP emissions are as follows:

- Green wood hammermill with bin vent control,
- Eight (8) hammermills and hammermill area handling operations controlled using bagfilters, and
- Twelve wood pellet presses and six (6) pellet coolers controlled using cyclones.

There are currently no pellet mills that are utilizing organic HAP pollution control technologies on these types of sources. Trace PM-matrixed HAP will be well controlled by best available control technology (BACT), as discussed in Section 4. In addition to the use of PM control technologies, Enviva proposes to minimize organic HAP emissions by maintaining the equipment in accordance with manufacturer's specifications and/or standard industry practices.

3.2. NORTH CAROLINA REGULATIONS

For the sources that are included for review in this application package, the North Carolina State Implementation Plan (SIP) rules and regulations have been evaluated for applicability. Applicable rules are identified below.

3.2.1. 15A NCAC 02D .0515 Particulates from Miscellaneous Industrial Processes

Particulate emissions from all emissions sources subject to permitting, including the wood pellet dryer, are regulated under 15A NCAC 2D .0515. This regulation limits the particulate emissions based on process throughput using the equation $E = 4.10 \times P^{0.67}$, for process rates (P) less than 30 tons per hour (ton/hr) and $E=55 \times P^{0.11}-40$ for process rates greater than 30 tons per hour.

All emissions from particulate matter sources at the proposed facility are either negligible or well-controlled. The most significant emission unit at the site, the process dryer operating at 71.71 ODT/hr, has an emission limit of 48 lb/hr. Maximum emissions from the dryer are approximately 12 lb/hr, well below the standard.

3.2.2. 15A NCAC 02D .0516 Sulfur Dioxide Emissions from Combustion Sources

Under this regulation, emissions of sulfur dioxide from combustion sources cannot exceed 2.3 pounds of sulfur dioxide per million Btu input. Wood is fired in the dryer and low sulfur diesel is combusted in the two emergency engines, resulting in operation well below regulatory limits.

3.2.3. 15A NCAC 02D .0521 Control of Visible Emissions

Under this regulation, for sources manufactured after July 1, 1971, visible emissions cannot be more than 20 percent opacity when averaged over a six-minute period. However, six-minute averaging periods may exceed 20 percent opacity under the following conditions:

- No six-minute period exceeds 87 percent opacity,
- No more than one six-minute period exceeds 20 percent opacity in any hour, and
- No more than four six-minute periods exceed 20 percent opacity in any 24-hour period.

This rule applies to all processes that may have a visible emission, including the dryer, other particulate matter emissions sources controlled by cyclone and/or baghouse, and the diesel-fired engines.

3.2.4. 15A NCAC 02Q .0700 Toxic Air Pollutant Procedures

This regulation requires that certain new and modified sources of toxic air pollutants with emissions exceeding specified de minimis values apply for an air toxics permit. Facility-wide emissions of several compounds emitted from the site exceed the permitting de minimis level. A comparison of emissions to de minimis values are summarized in Appendix B, Table B-3. Air dispersion modeling results for compounds triggering permitting are discussed in Section 5 of this application.

3.2.5. 15A NCAC 2D .1100 - Control of Toxic Air Pollutant Emissions

A toxic air pollutant (TAP) permit application shall include an evaluation of the TAP emissions from facility sources, excluding exempt sources listed under 15A NCAC 2Q .0702(a)(18). This regulation outlines the procedures that must be followed if modeling is required under 15A NCAC 2Q .0700. Air dispersion modeling results for compounds triggering permitting are discussed in Section 5 of this application.

3.2.6. Air Toxics Exemption

On May 1, 2014 DAQ Regulation 2Q .0702 was updated to exempt [2Q .0702(a)(27)] Part 63 NESHAP sources. Since Enviva is subject to NESHAP Subpart B, 112(g) 63.40-63.44 for the facility and the emergency engine and fire pump are subject to Subpart ZZZZ, NESHAP for Stationary Reciprocating Internal Combustion Engines, all these sources are exempt from air toxics review. For DAQ's information, Enviva has evaluated this project per 2Q .0704 and has determined through dispersion modeling that all AALs as listed in 2D .1100 are easily met. As such, Enviva has proven that there is no unacceptable risk.

SECTION 4
BACT DETERMINATION

4. BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

4.1. BACT DEFINITION

The requirement to conduct a BACT analysis is set forth in the PSD regulations [40 CFR 51.166(j)(2)]:

(j) Control Technology Review.
(2) A new major stationary source shall apply best available control technology for each regulated NSR pollutant that it would have the potential to emit in significant amounts.

BACT is defined in the PSD regulations [40 CFR 51.166(b)(12)] as:

...an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61.
[primary BACT definition]

If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.
[allowance for secondary BACT standard under certain conditions]

The primary BACT definition can be best understood by breaking it apart into its separate components.

4.1.1. Emission Limitation

an emissions limitation

First and foremost, BACT is an emission limit. While BACT is prefaced upon the application of technologies to achieve that limit, the final result of BACT is a limit. In general, this limit would be an emission rate limit of a pollutant (i.e., lb/MMBtu).[7] However, it should be noted that the definition of BACT specifically allows use of a work practice standard where emissions are not easily measured or enforceable.[8]

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[7] Emission limits can be broadly differentiated as "rate-based" or "mass-based." For a boiler, a rate-based limit would typically be in units of lb/MMBtu (mass emissions per heat input). In contrast, a typical mass-based limit would be in units of lb/hr (mass emissions per time).
[8] 40 CFR §51.166(b)(12).

4.1.2. Case-by-Case Basis

a case-by-case basis, taking into account energy, environmental and economic impacts and other costs

Unlike many of the Clean Air Act programs, the PSD program's BACT evaluation is case-by-case. As noted by EPA,

The case-by-case analysis is far more complex than merely pointing to a lower emissions limit or higher control efficiency elsewhere in a permit or a permit application. The BACT determination must take into account all of the factors affecting the facility .... The BACT analysis, therefore, involves judgment and balancing.

To assist applicants and regulators with the case-by-case process, in 1987 EPA issued a memorandum that implemented certain program initiatives to improve the effectiveness of the PSD program within the confines of existing regulations and state implementation plans. Among the initiatives was a "top-down" approach for determining BACT. The top-down process requires that all available control technologies be ranked in descending order of control effectiveness. The most stringent or "top" control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent alternative is evaluated in the same manner. This process continues until BACT is selected.

The five steps in a top-down BACT evaluation can be summarized as follows:

Step 1. Identify all possible control technologies
Step 2. Eliminate technically infeasible options
Step 3. Rank the technically feasible control technologies based upon emission reduction potential
Step 4. Evaluate ranked controls based on energy, environmental, and/or economic considerations
Step 5. Select BACT

As discussed in Section 4.1.1, the BACT limit is an emissions limitation or work practice standard and does not require the installation of any specific control device.

4.1.3. Achievable

based on the maximum degree of reduction [that NC DAQ] ... *determines is achievable ... through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques*

BACT is to be set at the lowest value that is achievable. However, there is an important distinction between emission rates achieved at a specific time on a specific unit, and an emission limitation that a unit must be able to meet continuously over its operating life. As discussed by the D.C. Circuit Court of Appeals

In National Lime Ass'n v. EPA, 627 F.2d 416, 431 n.46 (D.C. Cir. 1980), we said that where a statute requires that a standard be "achievable," it must be achievable "under most adverse circumstances which can reasonably be expected to recur."[9]

EPA has reached a similar conclusion in prior determinations for PSD permits.

Agency guidance and our prior decisions recognize a distinction between, on the one hand, measured 'emissions rates,' which are necessarily data obtained from a particular facility at a specific time, and on the other hand, the 'emissions limitation' determined to be BACT and set forth in the permit, which the facility is required to continuously meet throughout the facility's life. Stated simply, if there is uncontrollable fluctuation or variability in the measured emission rate, then the lowest measured emission rate will necessarily be more stringent than the "emissions limitation" that is "achievable" for that pollution control method over the life of the facility. Accordingly, because the "emissions limitation" is applicable for the facility's life, it is wholly appropriate for the permit issuer to consider, as part of the BACT analysis, the extent to which the available data demonstrate whether the emissions rate at issue has been achieved by other facilities over a long term.[10]

Thus, BACT must be set at the lowest feasible emission rate recognizing that the facility must be in compliance with that limit for the lifetime of the facility on a continuous basis. While individual unit performance can be instructive in evaluating what BACT might be, any actual performance data must be viewed carefully, as rarely will such data be adequate to truly assess the performance that a unit will achieve during its entire operating life. While statistical variability of actual performance can be used to infer what is "achievable," such testing requires a detailed test plan akin to what teams in EPA use to develop MACT standards over a several year period, and is far beyond what is reasonable to expect of an individual source. In contrast to limited snapshots of actual performance data, emission limits from similar sources can reasonably be used to infer what is "achievable."[11]

To assist in meeting the BACT limit, the source must consider production processes or available methods, systems or techniques, as long as those considerations do not redefine the source.

With regard to "achievable," we have become aware of a medium density fiberboard (MDF) mill in central North Carolina where an RTO that was controlling a wood drying operation was corroding to the extent that the rebuilds and maintenance required to keep it operating became exorbitant. The RTO operated for approximately 10 years and the RTO had nearly been completely rebuilt within this short period of time. In the application to remove the RTO, the applicant provided information that questioned the technical feasibility of operating an RTO for its operations.

While Enviva's pellet manufacturing operation is not a MDF operation, the drying process and design are similar. Corrosion and significant, well established, operation and maintenance issues associated with RTOs installed on wood products facilities are a major concern to Enviva. If a control device must be

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[9] As quoted in Sierra Club v. EPA (97-1686).
[10] EPA Environmental Appeals Board decision, *In re: Newmont Nevada Energy Investment L.L.C.* PSD Appeal No. 05-04, decided December 21, 2005. Environmental Administrative Decisions Volume 12, Page 442.
[11] Emission limits must be used with care in assessing what is "achievable." Limits established for facilities which were never built are unreliable, as they have never been demonstrated and that company never took a significant liability in having to meet that limit. Similarly, permitted units which have not yet commenced construction must also be viewed with care for similar reasons.

repaired so frequently that it is essentially rebuilt over a 10 year period, Enviva concludes that the control device is neither technically feasible nor able to meet a BACT limit over a long term period.

As such, Enviva does not think a BACT limit based on operation of a RTO is achievable over the life of the operating facility.

4.1.4. Floor

Emissions [shall not] *exceed* ...[40 CFR Parts 60 and 61]

The least stringent emission rate allowable for BACT is any applicable limit under either New Source Performance Standards (NSPS – Part 60) or National Emission Standards for Hazardous Air Pollutants (NESHAP – Part 61). While Clean Air Act section 112(b)(6) precludes use of Part 63 NESHAPs from establishing the floor, such standards are considered informative, representing maximum achievable control technology. State SIP limitations must also be considered when determining the floor.

4.2. BACT REQUIREMENT

The BACT requirement applies to each new or modified emission unit from which there are emissions increases of pollutants subject to PSD review. The proposed plant is subject to PSD permitting as described in Section 3. The compounds subject to PSD review and for which a BACT analysis is required are:

- Nitrogen oxides (NO_x),
- Carbon Monoxide (CO),
- Particulate matter ($PM/PM_{10}/PM_{2.5}$),
- Volatile organic compounds (VOC), and
- Greenhouse gases (GHGs).

The following table summarizes the emission units and pollutants which are considered in this BACT analysis:

Table 4-1. BACT Sources

Source Description	NOx (tpy)	PM/ PM_{10}/ $PM_{2.5}$ (tpy)	VOC (tpy)	CO (tpy)	GHG (tpy)
Dryer System	x	x	x	x	x
Green Wood Hammermills		x	x		
Hammermills/ Hammermill Area		x	x		
Pellet Presses and Coolers		x	x		
Pellet Mill Feed Silo		x			
Pellet Mill Fines Bin		x			
Finished Product Handling/ Pellet Loadout Bins/ Pellet Loadout Areas		x			
Log Bark Hog			x		
Log Chipping			x		
Storage Piles		x	x		
Green Wood Handling		x			
Roads		x			
Emergency Generator	x	x	x	x	x
Fire Water Pump	x	x	x	x	x

Note that the same control techniques that reduce PM also reduce filterable PM_{10} and $PM_{2.5}$. The PM_{10} BACT analysis will satisfy BACT for PM and $PM_{2.5}$. In the prepared BACT analyses, references to PM_{10} are also relevant to PM and $PM_{2.5}$ and neither PM nor $PM_{2.5}$ are explicitly addressed separately.

4.3. BACT ASSESSMENT METHODOLOGY

The following sections provide detail on the BACT assessment methodology utilized in preparing the BACT analysis for the proposed emission units. As previously noted, the minimum control efficiency to be considered in a BACT assessment must result in an emission rate less than or equal to any applicable NSPS or Part 61 NESHAP emission rate for the source. The definition of BACT only extends to Part 61 NESHAPs and Section 112(b)(6) of the Clean Air Act precludes use of Part 63 NESHAPs from establishing BACT. For purposes of this application, Part 63 NESHAPs will not establish the BACT floor.

4.3.1. Identification of Potential Control Technologies

Potentially applicable emission control technologies are identified for each compound in this analysis using information from the following resources:

- RBLC (RACT/BACT/LAER Clearinghouse) database located on EPA's Technology Transfer Network in the EPA electronic bulletin board system,
- Various EPA reports on emissions control technologies,
- Various air pollution control technology vendors,
- Pending permit applications and issued permits for similar facilities, and
- Compilation of Air Pollution Emission Factors (AP-42) published by EPA.

It should be noted that the RBLC only includes one determination for a wood pellet mill, determination VA-0298, This project was permitted a number of years ago using a conceptual "wood-fired RTO" technology for VOC control, but the plant was never constructed because, according the VA Department of Environmental Quality, the project was unable to obtain financing.

4.3.2. Economic Feasibility Calculation Process

Economic analyses are performed to compare total costs (capital and annual) for potential control technologies. Capital costs include the initial cost of the components intrinsic to the complete control system. Annual operating costs include the financial requirements to operate the control system on an annual basis and include overhead, maintenance, outages, raw materials, and utilities.

The capital cost estimating technique used is based on a factored method of determining direct and indirect installation costs. That is, installation costs are expressed as a function of known equipment costs. This method is consistent with the latest EPA OAQPS guidance manual on estimating control technology costs.[12]

Total Purchased Equipment Cost represents the delivered cost of the control equipment, auxiliary equipment, and instrumentation. Auxiliary equipment consists of all the structural, mechanical, and electrical components required for the efficient operation of the device. Auxiliary equipment costs are estimated as a straight percentage of the equipment cost. Direct installation costs consist of direct expenditures for materials and labor for site preparation, foundations, structural steel, erection, piping, electrical, painting and facilities. Indirect installation costs include engineering and supervision of contractors, construction and field expenses, construction fees, and contingencies. Other indirect costs include equipment startup, performance testing, working capital, and interest during construction.

Annual costs are comprised of direct and indirect operating costs. Direct annual costs include labor, maintenance, replacement parts, raw materials, utilities, and waste disposal. Indirect operating costs include plant overhead, taxes, insurance, general administration, and capital charges. Replacement part costs, such as the cost of replacement catalysts, are included where applicable, while raw material costs are estimated based upon the unit cost and annual consumption. With the exception of overhead, indirect operating costs are calculated as a percentage of the total capital costs. The indirect capital costs are based on a capital recovery factor (CRF) defined as:

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

where *i* is the annual interest rate and *n* is the equipment life in years. The equipment life is based on the normal life of the control equipment and varies on an equipment type basis. [13]

Detailed cost analyses calculations are presented in Appendix D.

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[12] EPA, *OAQPS Control Cost Manual*, 6th edition, EPA 452/B-02-001, July 2002. http://www.epa.gov/ttn/catc/dir1/c_allchs.pdf

[13] EPA, *OAQPS Control Cost Manual*, 6th edition, Section 2, Chapter 1, page 1-52. http://www.epa.gov/ttn/catc/dir1/c_allchs.pdf

4.3.3. PSD Impact Analysis of Control Alternatives

As discussed above, the economic, environmental, and energy impacts of technically feasible BACT options are evaluated according to the top-down BACT process. The first step involves a technical feasibility analysis of all potential control options, and the next step involves an evaluation of the economic impacts of feasible control alternatives with primary consideration of the cost effectiveness (dollars per ton of compound removed) for each option. The economic analysis is typically based on vendor quotes and/or established EPA cost estimating procedures. An environmental impact analysis was then performed to determine whether any adverse "non-air" impacts are associated with an alternative. The last analysis involved calculating energy impacts, or increased energy requirements, associated with each option.

4.4. DRYER SYSTEM

Enviva plans to utilize a rotary drying kiln to reduce wood moisture content. Direct contact heat will be provided to the system via a 250.4 MMBtu/hr burner system. Air emissions will be controlled by three simple cyclones and then a wet electrostatic precipitator (WESP) operating in series. The pollutants emitted from the dryer that are subject to BACT review are NO_x, CO, TSP/PM_{10}/$PM_{2.5}$, VOC, and GHGs (CO_2, CH_4, and N_2O expressed as CO_2e). The control technology assessment for each compound subject to PSD review is provided below.

4.4.1. Nitrogen Oxides (NO_x)

The formation of NO_x is determined by the interaction of chemical and physical processes occurring within the flame zone of the furnace of the proposed boiler. There are two principal forms of NO_x, "thermal" NO_x and "fuel" NO_x. Thermal NO_x formation is the result of oxidation of atmospheric nitrogen contained in the inlet gas in the high-temperature, post-flame region of the combustion zone. The major factors influencing thermal NO_x formation are temperature, concentrations of combustion gases (primarily nitrogen and oxygen) in the inlet air and residence time within the combustion zone. Fuel NO_x is formed by the oxidation of fuel-bound nitrogen. NO_x formation can be controlled by adjusting the combustion process and/or installing post-combustion controls.

4.4.1.1. Identify Control Technologies

A summary of results from the RBLC is provided in Table D-1.

Potentially applicable NO_x control technologies are:

- Conventional Selective Catalytic Reduction (SCR),
- Regenerative Selective Catalytic Reduction (RSCR), and
- Selective Non-Catalytic Reduction (SNCR).

Conventional Selective Catalytic Reduction and Regenerative Selective Catalytic Reduction Technologies: Conventional Selective Catalytic Reduction (SCR) is a post combustion NO_x add-on control device that is placed in the flue gas stream following the boiler. SCR involves the injection of ammonia (NH_3) into the flue gas stream ahead of a catalyst bed. On the catalyst surface, ammonia reacts with NO_x contained within the air to form nitrogen gas (N_2) and water (H_2O) in accordance with the following chemical equations:

$4NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$
$4NH_3 + 2NO_2 + O_2 \rightarrow 3N_2 + 6H_2O$

The catalyst's active surface is usually either a noble metal (platinum), base metal (titanium or vanadium), or a zeolite-based material. Metal-based catalysts are usually applied as a coating over a metal or ceramic substrate. Zeolite catalysts are typically a homogenous material that forms both the active surface and the substrate. The geometric configuration of the catalyst body is designed for maximum surface area and minimum obstruction of the flue gas flow path in order to achieve maximum conversion efficiency and minimum back pressure. The most common configuration is a "honeycomb" design. In a typical ammonia injection system, ammonia is drawn from a storage tank, vaporized and injected upstream of the catalyst bed. Excess ammonia that is not reacted in the catalyst bed and emitted is referred to as ammonia slip. An important factor that affects the performance of an SCR is operating temperature. The temperature range for standard base metal catalyst is between 400-800ºF.

The flue gas in wood-fired systems prior to final particulate matter controls contain alkali metals such as sodium, potassium and zinc and trace heavy metals that poison and "blind" the SCR catalyst. It is believed that there are no conventional SCR systems operating after wood-fired combustion systems in the U.S. There are a few systems reportedly operating in Europe utilizing such systems; however, these are specialized systems operating on power plants utilizing bubbling fluidized bed and circulating fluidized bed boilers and these systems reportedly require unusually high maintenance.

Babcock Power Inc. developed a new SCR system that can be installed after final particulate matter emissions controls. This relatively new technology, called Regenerative Selective Catalytic Reduction or "RSCR" utilizes beds of ceramic media to raise the temperature of the flue gas after particulate control, to a temperature needed for reaction. The main advantage of an RSCR system is that it operates in a cleaner environment providing improved catalyst performance and high thermal efficiency. In the RSCR, the gas passes through a preheated bed where it is heated from the temperature of the exhaust exiting the final PM control device (approximately 170 ºF). Burners raise the flue gas temperature to 470 ºF before it flows across the adjacent catalyst canister, where NO_x reduction occurs. The exhaust gas from the catalyst bed then heats an adjacent bed containing heat transfer media. This heated bed then becomes the preheater for the exhaust. Flow direction continues to alternate in this fashion.

Selective Non-Catalytic Reduction: Selective Non-Catalytic Reduction (SNCR) describes a process by which NO_X is reduced to molecular nitrogen (N_2) and water (H_2O) by injecting an ammonia or urea ($CO(NH_2)_2$) spray into the post-combustion area of the unit. Typically, injection nozzles are located in the upper area of the furnace and convective passes. Once injected, the urea or ammonia decomposes into NH_3 or NH_2 free radicals, reacts with NO_X molecules, and reduces to nitrogen and water. The ammonia and urea reduction equations are provided below. These reactions are endothermic and use the heat of the burners as energy to drive the reduction reaction:

$$2NO + 2NH_3 + \frac{1}{2}O_2 \longrightarrow 2N_2 + 3H_2O$$

$$2NO + CO(NH_2)_2 + \frac{1}{2}O_2 \longrightarrow 2N_2 + CO_2 + 2H_2O$$

Both ammonia and urea have been successfully employed as reagents in SNCR systems and have certain advantages and disadvantages. Ammonia is less expensive than urea and results in substantially less operating costs at comparable levels of effectiveness. Urea, however, is able to penetrate further into flue gas streams, making it more effective in larger scale burners and combustion units with high exhaust flow rates.

SNCR is considered a selective chemical process because, under a specific temperature range, the reduction reactions described above are favored over reactions with other flue gas components. Although other operating parameters such as residence time and oxygen availability can significantly affect performance, temperature remains one of the most prominent factors affecting SNCR performance.

The SNCR process requires the installation of reagent storage facilities, a system capable of metering and diluting the stock reagent into the appropriate solution, and an atomization/injection system at the appropriate locations in the combustion unit. The reagent solution is typically injected along the post-combustion section of the combustion unit. Injection sites around the unit must be optimized for reagent effectiveness and must balance residence time with flue gas stream temperature.

For ammonia, the optimum reaction temperature range is approximately 880 to 1,100 degrees Celsius (°C) (1,615 to 2,000 °F). Below the SNCR operating temperature range, the NH_3/NO_x reaction will not occur. The unreacted NH_3 will either be emitted as NH_3 slip or it will react with SO_3 to form ammonium salts. Above the optimal temperature range, the amount of NH_3 that oxidizes to NO_x increases and NO_x reduction performance deteriorates.

4.4.1.2. Eliminate Technically Infeasible Options

Conventional SCR and Regenerative SCR: As discussed in the previous section, there are substantial technical concerns about poisoning/blinding of catalysts utilized within a conventional SCR system and our research indicates that there are no such systems operating on a source similar to the wood-fired dryer burner system anywhere in the world. RSCR has not been demonstrated on a wood chip dryer in the past. Potential impacts of salts carry over from the WESP needed for particulate matter control may poison catalyst and, furthermore, the low temperate of the exhaust from the WESP (~170 °F) makes reheat necessary for appropriate catalyst operating temperature impracticable. Thus, both conventional SCR and RSCR are considered undemonstrated/technically infeasible technologies for wood dryers.

Despite questionable technical feasibility of SCR and RSCR, this analysis has nonetheless assumed for the purposes of this economic analysis that a SCR and RSCR system are technically feasible.

4.4.1.3. Rank Remaining Control Technologies by Effectiveness

There are three NO_x control technologies that have been considered technically feasible for the boilers – RSCR, conventional SCR, and SNCR.

4.4.1.4. Evaluate Most Effective Control Option (Impacts Analysis)

4.4.1.4.1 RSCR (0.068 lb/MMBtu NO_x)

Economic Impacts

A detailed cost evaluation of RSCR is included in Table D-1. As shown in Table D-4, a cost effectiveness of approximately $13,132 per ton of NO_x was estimated. This cost is considered prohibitive, and RSCR is therefore eliminated from further consideration in the BACT evaluation.

Energy Impacts

Energy requirements for a RSCR system consist primarily of the power needed for the fan and fan power to overcome catalyst pressure. It is estimated that the energy impact associated with it is approximately 4.19×10^6 KWH/yr. This value does not include the energy for re-heating the gas stream.

Environmental Impacts

There are no major adverse environmental impacts.

4.4.1.4.2 SCR (0.068 lb/MMBtu NO_x)

Economic Impacts

As presented in Tables D-2 and D-5, SCR can achieve an annual average NO_x level of 0.068lb/MMBtu at approximately $22,164/ton of NO_x reduction. This cost is considered prohibitive, and SCR is therefore eliminated from further consideration in the BACT evaluation.

Energy Impacts

Energy requirements for an SCR system primarily consist of the power needed for ammonia injection. It is estimated that the energy impact associated with SCR control is approximately 2.51×10^7 KWH/yr.

Environmental Impacts

There are no major adverse environmental impacts.

4.4.1.4.3 SNCR (0.150 lb/MMBtu)

After discussions between Enviva and a major SNCR vendor, and some testing of the efficiency of an SNCR on an average basis, an SNCR control option of 0.150 lb/MMBtu was determined to be an achievable emission rate in the proposed burner system.

Economic Impacts

As shown in Tables D-3 and D-4, the SNCR can achieve a NO_x level of 0.150lb/MMBtu at approximately $3, 176/ton of NO_x reduction. This cost is not considered cost effective given the negligible impact of the dryer on air quality. As discussed in Section 5, the maximum modeled one-hour average concentration for nitrogen dioxide (NO_2) is only 65.1 $\mu g/m^3$ (including a background of 32.1 $\mu g/m^3$), which is approximately 42% of the NAAQS. The maximum dryer contribution is only 16.1 $\mu g/m^3$ at the maximum receptor.

Energy Impacts

Energy requirements for an SNCR system primarily consist of the power needed for ammonia injection. It is estimated that the energy impact associated with SNCR control is approximately 1.92×10^4 KWH/yr.

Environmental Impacts

There are no major adverse environmental impacts.

4.4.1.5. Select BACT

The baseline emission rate proposed by the dryer vendor of 0.20 lb/MMBtu utilizing good combustion practices and low NOx burners is proposed as BACT.

4.4.2. Particulate Matter ($TSP/PM_{10}/PM_{2.5}$)

Particulate matter (TSP/PM_{10}) is emitted as both filterable and condensable particulate matter. Enviva has designed the rotary dryer system with three identical simple cyclones, considered the baseline level of control, for particulate matter removal.

4.4.2.1. Identify Control Technologies

Potentially applicable TSP/PM_{10} add-on control technologies (in addition to the base simple cyclones) are:

- Baghouse,
- Electrostatic Precipitator (ESP), and
- Wet Electrostatic Precipitator (WESP).

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

The particulate removal efficiency of fabric filters is dependent upon a variety of particle and operational characteristics. Particle characteristics that affect the collection efficiency include particle size distribution, particle cohesion characteristics, and particle electrical resistivity. Operational parameters that affect fabric filter collection efficiency include air-to-cloth ratio, operating pressure loss, cleaning sequence, interval between cleanings, cleaning method, and cleaning intensity. In addition, the particle collection efficiency and size distribution can be affected by certain fabric properties (e.g., structure of fabric, fiber composition, and bag properties).

Electrostatic Precipitator: Electrostatic precipitators (ESPs) remove particles from a gas stream through the use of electrical forces. Discharge electrodes apply a negative charge to particles passing through a strong electrical field. These charged particles then migrate to a collecting electrode having an opposite, or positive, charge. Collected particles are removed from the collecting electrodes by periodic mechanical rapping.

Wet Electrostatic Precipitator: WESPs remove particles from a gas stream through the use of electrical forces. Discharge electrodes apply a negative charge to particles passing through a strong electrical field. These charged particles then migrate to a collecting electrode having an opposite, or positive, charge. Collected particles are removed from the collecting electrodes by washing utilizing a mild hydroxide solution to prevent buildup of resinous materials present in the dryer exhaust. Wet ESPs versus dry ESPs are utilized in the forest products industries for control of emissions from similar dryer sources because dry ESPs cannot reliably operate due to resin buildup on collection electrodes.

4.4.2.2. Eliminate Technically Infeasible Options

Although an effective form of particulate control in many applications, use of a baghouse is technically infeasible due to condensation of resinous compounds on the baghouse leading to blinding. Wood chip dryers are optimized for thermal efficiency to recirculate as much air as possible through the system without leading to excess moisture and condensation problems within the drying system. However, as the exhaust leaves the process it is sufficiently laden with moisture and resinous compounds that condensation in a baghouse frequently occurs.

Dry ESPs are also not designed to operate under conditions in which the gas stream contains water vapor or other moist/sticky elements. Because of the nature of the moist, sticky exhaust stream, it would be expected to see particulate agglomeration on dry ESPs. Therefore the baghouse and dry ESP are technically infeasible to control PM. Consequently, baghouse and dry ESP control are eliminated from further consideration in the BACT analysis.

4.4.2.3. Rank Remaining Control Technologies by Effectiveness

There is only one feasible control technology for the rotary dryer, a WESP.

4.4.2.4. Evaluate Most Effective Control Option (Impacts Analysis)

Tables D-5 and D-6 indicate that that the cost effectiveness of achieving the most stringent control option of 0.105 lb/ODT using WESP control is $3,254 cost per ton. Given that $PM_{2.5}$ modeling results for the project is near the allowable increment, this cost effectiveness is considered reasonable.

There are numerous sources utilizing this method of control on forest products dryers, so energy impacts are not considered adverse. Wastewater is pretreated prior to discharge to the local wastewater treatment plant, so there will be no adverse environmental impacts.

4.4.2.5. Select BACT

Since the baghouse and dry ESP are deemed technically infeasible, the plant will utilize cyclones followed by a WESP to minimize total PM emissions. Although WESPs control filterable and condensable PM, the degree to which condensable PM is controlled is not well characterized and cannot be estimated with confidence. Since WESP control efficiency for filterable PM in a wood-fired application is well-characterized, but condensable PM is not, Enviva proposes a filterable PM limit of 0.105 lb/ODT, which is equivalent to the non-applicable NSPS limit of 0.03 lb/MMBtu. It should be noted that for conservatism, condensable PM from the dryer included in air dispersion modeling was based on conservative AP-42 factors.

4.4.3. Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

CO emissions from biomass combustion are a by-product of incomplete combustion when carbon is not fully oxidized to CO_2. Likewise, VOC is emitted when the carbonaceous matter in the fuel is not converted to CO_2 or CO. Control of both species involves forcing the oxidation of carbon to CO_2. Conditions leading to incomplete combustion include the following: insufficient oxygen availability, poor fuel/air mixing, reduced combustion temperature, reduced combustion gas residence time, and load reduction.

Enviva will design the pellet milling equipment to utilize at least 25 percent hardwood. Hardwood species emit less VOC than the more common softwood species and it is anticipated that the plant would emit less VOC than a traditional softwood mill. It should be noted that wood chip drying systems such as the one proposed recirculate approximately 50-60 percent of dryer air into the combustion makeup air for the burner to optimize thermal efficiency and achieve partial VOC destruction.

A variety of forest products industries have attempted to utilize VOC oxidation abatement equipment. Use of such controls has shown evidence of operational difficulties requiring regular, significant capital investments to replace various equipment in the oxidation system. The following analysis ignores these additional costs; however, the useful economic life of oxidation controls has been assumed to be 10 years. Ten years is conservatively long because experience with the forest products industry has shown that the major components of these systems are typically replaced at an even more frequent schedule. Due to the adverse effects of corrosion the entire cost of an oxidation systems utilized in the forest products industry will typically be incurred more frequently than every 10 years.

4.4.3.1. Identify Control Technologies

CO and VOC emissions from the wood dryer can be controlled by process design and/or add-on oxidation technologies. Based upon a search of RBLC results and commercially demonstrated technology, only the following control technologies are considered in this evaluation:

- Process design,
- Regenerative thermal oxidation (RTO),
- Regenerative catalytic oxidation (RCO),
- Thermal Catalytic Oxidation (TCO),
- Packed-Bed Catalytic Wet Scrubber, and
- Bio-oxidation / Bio-filtration.

PROCESS DESIGN: Enviva will design the pellet milling equipment to utilize at least 25 percent hardwood species and will install an inherently low emitting, low temperature dryer system.

REGENERATIVE THERMAL OXIDATION: RTOs use high-density media such as a ceramic-packed bed still hot from a previous cycle to preheat an incoming VOC and CO-laden waste gas stream. The preheated, partially oxidized gases then enter a combustion chamber where they are heated by auxiliary fuel (natural gas) combustion to a final oxidation temperature typically between 760 to 820 °C (1400 to 1500 °F) and maintained at this temperature to achieve maximum VOC destruction. The purified, hot gases exit this chamber and are directed to one or more different ceramic-packed beds cooled by an earlier cycle. Heat from the purified gases is absorbed by these beds before the gases are exhausted to the atmosphere. The reheated packed-bed then begins a new cycle by heating a new incoming waste gas stream.

REGENERATIVE CATALYTIC OXIDATION: Regenerative catalytic oxidation (RCO) technology is widely used in the reduction of VOC emissions. It operates in the same fashion as an RTO, but it requires only moderate reheating to the operating range of the catalyst, approximately 450 °F. Furthermore, RCOs can achieve a high thermal efficiency of 95% because they utilize a ceramic bed to recapture the heat of the stream exiting the combustion zone. Particulate control must be placed upstream of an RCO. Even with highly efficient TSP/PM10 control, there is the risk of catalyst blinding/poisoning and catalyst life guarantees are relatively short.

THERMAL CATALYTIC OXIDATION: Operating much in the same fashion as an RCO, thermal catalytic oxidation (TCO), passes heated gases through a catalyst without the regenerative properties attributed by the ceramic bed used to recapture heat.

PACKED-BED CATALYTIC WET SCRUBBER: This technology is reportedly able to reduce overall VOC emissions by approximately 30 percent.

BIO-OXIDATION / BIO-FILTRATION: Bio-filtration offers an alternative to costly thermal or catalytic units. It is an air pollution control technology – offering upwards of 80% or more control efficiency – in which VOCs are oxidized using living micro-organisms on a media bed (sometimes referred to as a "bioreactor"). A fan is typically used to collect or draw contaminated air from a building or process. If the air is not properly conditioned (heat, humidity, solids), then pre-treatment may be a necessary step to obtain optimum gas stream conditions before introducing it into the bioreactor. As the emissions flow through the bed media, the pollutants are absorbed by moisture on the bed media and come into contact with the microbes. The microbes consume and metabolize the excess organic pollutants, converting them into CO_2 and water, much like a traditional oxidation process.

"Mesophilic" microbes are typically used in these systems. Mesophilic microbes can survive and metabolize VOC materials at conditions up to 110°F to 120°F. One company is attempting to develop a commercial-scale technology that employs "thermophilic" microbes, but that technology has only been demonstrated on a single pilot scale installation that has a similar – but not exactly the same – exhaust stream profile as Enviva. Thermophilic microbes live and metabolize VOC at higher operating temperatures (~160°F).

4.4.3.2. Eliminate Technically Infeasible Options

While there are a number of techniques that can be used to control VOC, the following technologies are not practical for VOC control at the Enviva plant.

- Packed Bed Catalytic Scrubber, and
- Bio-oxidation / Bio-filtration,
- Regenerative catalytic oxidation (RCO), and
- Thermal Catalytic Oxidation (TCO).

Only RCO and TCO are suitable to control CO.

PACKED BED WET SCRUBBER: This technology is still within an early startup mode of operation at its first full-scale demonstration in Moncure, NC. Until the technology can demonstrated to operate reliably with an established VOC control efficiency over an extended period of time, this technology is not considered to be a feasible control technology.

BIO-OXIDATION / BIO-FILTRATION: In the case of the bio-oxidation or bio-filtration, many questions still remain regarding the technology's efficacy to effectively remove VOC and HAP emissions at the Enviva plant.

To our knowledge, use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Due to the undemonstrated nature of this technology at a pellet manufacturing facility, it has been eliminated from further consideration in this BACT analysis.

REGENERATIVE CATALYTIC OXIDATION/ THERMAL CATALYTIC OXIDATION: There are no wood pellet manufacturing facilities using RCOs or TCOs and operation of catalyst control downstream of drying operations utilizing WESPs for particulate control, which will be used at this facility, are prone to major corrosion and catalyst fouling due to deposition of entrained salts and high operating temperatures. Due to operational problems and the undemonstrated nature of use of catalyst controls after a WESP in the wood pellets manufacturing industry, use of RCO or TCO control is rejected from further consideration.

4.4.3.3. *Rank Remaining Control Technologies by Effectiveness*

After eliminating the technically infeasible control options, Enviva has determined the following options remain and has ranked them in order of greatest to least control of VOC emissions:

- Regenerative thermal oxidation (RTO).

4.4.3.4. *Evaluate Most Effective Control Option (Impacts Analysis)*

4.4.3.4.1 Regenerative Thermal Oxidation (0.107 lb/ODT VOC and 0.042 lb/ODT CO)

Economic Impacts

Results of the economic impacts evaluation for operation of the RTO are presented in Tables D-7, D-8 and D-9. Capital and operating costs are based on vendor quotes, the OAQPS Manual, and past permitting experience. Other cost impacts are estimated using EPA cost methodologies. Table D-7 presents a breakout of costs used in the economic impacts evaluation.

Capital Costs for the RTO are provided to Enviva by GEOENERGY. Economic Life of the RTO of 10 years was also supplied by the vendor, which is also consistent with Trinity experience.

As shown in Tables D-8, the VOC cost-effectiveness of operation of the RTO is approximately $7,245/ton VOC, which is considered cost prohibitive, particularly when considering that operation of the unit will have negligible impact to ozone formation in this rural region of the state, which is "NOx limited."

Please also refer back to the discussion of the MDF plant in central NC that was previously mentioned above in Section 4.1.3. In that application, their cost effectiveness for a RTO based on actual costs and operating data was $5,283/ton. Enviva requests that DAQ consider the above referenced RTO cost data in its review of our application, not only for this drying operation, but also for the other VOC sources at our pellet manufacturing facility

As shown in Tables D-9, the CO cost-effectiveness of operation of the RTO is approximately $10,194/ton CO, which is considered cost prohibitive

Energy Impacts

The additional energy required to operate the RTO is about 5.2 x 10^6 KWH/yr.

Environmental Impacts

There are adverse impacts from the operation of an RTO in the form of increased emissions of criteria pollutants, particularly NO_x which can lead to increased formation of ozone in NO_x-limited regions like Sampson County, and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.4.3.4.2 Process Design (1.07 lb/ODT VOC and 0.210 lb/ODT CO)

There are no adverse economic, energy, or environmental impacts associated with designing the process to utilize at least 25% hardwood and incorporating a low temperature drying system. Use of hardwood has been used to establish baseline emissions and results in a VOC reduction compared to a traditional softwood mill.

4.4.3.5. Select BACT

Because RTO abatement technology is deemed to be cost prohibitive, the plant will utilize process design to minimize total VOC emissions to 1.07 lb/ODT on an annual average basis and CO to 0.21 lb/ODT CO.

4.4.4. Greenhouse Gases (CO_2, CH_4, N_2O)

On July 1, 2011, EPA signed the Deferral for CO_2 Emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration (PSD) and Title V Programs to defer permitting of these sources for a three-year period. On July 12, 2013, federal appellate judges vacated EPA's deferral rule for the GHG permitting of biomass-fired units. On July 21, 2014, per 40 CFR Part 51.166(b)(48), the rule no longer allows the exclusion of CO_2 from review under PSD. Therefore, as discussed with NCDAQ and using the July 24, 2014 EPA guidance, Enviva is providing a GHG BACT analysis for the wood dryer.

Since there will be a major emissions increase of GHGs from the wood-fired dryer, a BACT analysis for GHGs is being conducted on this unit. For a combustion unit, GHG emissions of CO, CH_4, and N_2O are anticipated as a result of the combustion processes; therefore, a BACT review must be conducted for CO_2e.

The U.S. EPA issued several new guidance documents related to the completion of GHG BACT analyses. The following guidance documents were utilized as resources in completing the GHG BACT evaluation for the proposed project:

- *PSD and Title V Permitting Guidance For Greenhouse Gases*, March 2011 (hereafter referred to as General GHG Permitting Guidance)[14]
- *Guidance For Determining Best Available Control Technology For Reducing Carbon Dioxide Emissions from Bioenergy Production*, (March 2011) (hereafter referred to as Bioenergy Permitting Guidance)[15]
- *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Industrial, Commercial, and Institutional Boiler*, October 2010 (hereafter referred to as GHG BACT Guidance for Boilers)[16]
- *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Pulp and Paper Industry*, October 2010 (hereafter referred to as GHG BACT Guidance for Pulp and Paper Industry)[17]

To complete the GHG BACT evaluation, Enviva also relied on additional resources such as:

- Dryer specifications provided by Enviva
- RBLC database – Searching the newly enhanced RBLC database returned one result for a biomass fired dryer based on a search for keyword "dryer" and carbon dioxide (CO_2) as a pollutant.[18] The

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[14] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, (Research Triangle Park, NC: U.S. EPA EPA-HQ-OAR-2010-0841-0001, March 2011). http://www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf

[15] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, (Washington, DC, March 2011). http://www.epa.gov/nsr/ghgdocs/bioenergyguidance.pdf

[16] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, (Research Triangle Park, NC: October 2010). http://www.epa.gov/nsr/ghgdocs/iciboilers.pdf

[17] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, (Research Triangle Park, NC: October 2010). http://www.epa.gov/nsr/ghgdocs/pulpandpaper.pdf

[18] http://cfpub.epa.gov/RBLC/

BACT determination for this dryer was the combustion of biomass and the use of good combustion/operating practices to control GHGs. The RBLC database returned two results for dryers based on a search for keyword "dryer" and carbon dioxide equivalent (CO_2e). The BACT determination for the wood dryer in one record was the use of waste heat from the main boiler to provide approximately 30% of the energy for drying the wood used in manufacturing pellets. The second record was for a natural gas dryer in the clay manufacturing industry that demonstrated BACT with good heating insulation and good combustion practices.

4.4.4.1. Identification of Potential CO_2e Control Techniques (Step 1)

The following potential CO_2e control strategies for the wood-fired dryer were considered as part of this BACT analysis:

- Carbon capture and storage (CCS)
- Selection of lowest carbon fuel
- Installation of energy efficient options for the wood-fired dryer
- Fuel Switching - According to the GHG BACT Guidance for Boilers, fuel switching is only applicable to coal-fired and oil-fired boilers; therefore it is not addressed further in this application.

4.4.4.1.1 Carbon Capture and Storage

EPA's General GHG Permitting Guidance suggests that carbon capture and storage (CCS) be evaluated as an available control for substantial, large projects such as steel mills, refineries, and cement plants where CO_2e emissions levels are in the order of 1,000,000 tpy CO_2e, or for industrial facilities with high-purity CO_2 streams.[19] However, EPA explained that "[t]his does not mean CCS should be selected as BACT for such sources." The proposed wood-fired dryer does not produce a concentrated CO_2 stream. Nonetheless, CCS is evaluated as a control option for the proposed project.

CCS is a multi-stage control strategy that involves the separation and capture of CO_2 emissions from the GHG emission unit's exhaust, pressurization of the captured CO_2, transportation of the pressurized CO_2 via pipeline, and finally injection and long-term geologic storage of the captured CO_2. Several different technologies have demonstrated the potential to separate and capture CO_2, though these technologies are at varying stages of development. To date, some of these technologies have been demonstrated at the laboratory scale only, while others have been proven effective at the slip-stream or pilot-scale. Numerous projects are currently planned for the full-scale demonstration of CCS technologies.

According to the U.S. EPA guidance for PSD and Title V Permitting of Greenhouse Gases, CCS

> *...is a promising technology in the early stage of demonstration and commercialization. While it should be identified as an available control measure in the first step of BACT for the large combustion source in these high GHG emitting sectors (Fossil-Fuel Fired Power Plants, Cement Production, and Iron and Steel Manufacturing), it is currently an expensive technology and unlikely to be selected as BACT in most cases.*[20]

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[19] General GHG Permitting Guidance at 42-43.

[20] US EPA, Office of Air Quality Planning and Standards, "PSD and Title V Permitting Guidance for Greenhouse Gases", March 2011, p. 37.

It should be noted that the "high GHG emitting sectors" identified in the guidance document do not include combustion units of the size and nature proposed by Enviva.

In addition to the U.S. EPA permitting guidance for GHG, white papers for GHG reduction options were reviewed for discussion of CCS technologies. In the Industrial, Commercial, and Institutional Boiler GHG reduction white paper, a brief overview of the CCS process is provided and the guidance cites the Interagency Task Force on Carbon Capture and Storage for the current development status of CCS technologies, which is discussed below.[21,22]

In the aforementioned Interagency Task Force report on CCS technologies and in a recent update to that report issued in June 2013[23], a number of pre and post combustion CCS projects are discussed in detail; however, many of these projects are in formative stages of development and are predominantly power plant demonstration projects (and mainly slip stream projects). Capture-only technologies are technically available; however, the limiting factor is typically the lack of a geographic formation or pipeline for the carbon to be permanently sequestered.

Beyond power plant CCS demonstration projects, the report and the Carbon Capture and Sequestration Database (maintained by MIT)[24] also discuss industrial CCS projects that are being pursued under the Industrial Carbon Capture and Storage (ICCS) program.

At present, these research and development industrial deployments are in various stages of planning, completion, and testing. However, these projects are backed by government funding and selected for their proximity to available CO_2 pipelines and geologic formations appropriate for sequestration.

4.4.4.1.2 Selection of the Lowest Carbon Fuel

For GHG BACT analyses, low-carbon intensity fuel selection is the primary control option that can be considered a lower emitting process. The wood-fired dryer will combust biomass (wood chips and bark) as the fuel. Selecting low-carbon fuels is the primary control option for GHG emissions. Biomass is considered by the Intergovernmental Panel on Climate Change (IPCC) to be a carbon neutral fuel, as it is derived from trees, which are a renewable resource that consume CO_2 as they grow[25]. In addition, the fuel used in the dryer is a waste material which, if not used in the dryer, would rapidly decompose releasing both CO2 and methane, a more potent greenhouse gas. Hence, although combustion of biomass results in the release of more CO_2 per unit of heat released than does, for example, natural gas, the CO_2 released from combustion of biomass does not result in a long term increase in the CO_2 content of the atmosphere, as would be the case with combustion of a fossil fuel. Biomass is available in abundance at the Facility as a byproduct of the wood pellet making process, and is therefore an economically viable source of energy for the Facility. The economics of biomass as a fuel is key to the viability of the proposed project. Therefore, firing biomass as a primary fuel is considered an available option.

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[21] US EPA, "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Industrial, Commercial and Institutional Boilers," October 2010, p. 26, http://www.epa.gov/nsr/ghgdocs/iciboilers.pdf
[22] "Report of the Interagency Task Force on Carbon Capture and Sequestration," August 2010, http://fossil.energy.gov/programs/sequestration/ccstf/CCSTaskForceReport2010.pdf
[23] "Carbon Capture and Sequestration: Research, Development, and Demonstration at the U.S. Department of Energy", June 10, 2013, http://www.fas.org/sgp/crs/misc/R42496.pdf
[24] http://sequestration.mit.edu/tools/projects/index.html
[25] http://www.ipcc.ch/meetings/session25/doc4a4b/vol4.pdf

Natural gas is the lowest carbon content fossil fuel, and is available at the Facility. However, natural gas is a much more expensive fuel than biomass for the Facility, and it would not be economically feasible for the Facility to combust natural gas as a primary fuel in its dryer. Therefore, firing natural gas as a fuel is only considered an available option. Other "clean fuels" options are not required to be considered according to the General GHG Permitting Guidance since that would fundamentally redefine the source by requiring the permit applicant to switch to a primary fuel type other than the type of fuel that the applicant proposes to use for its combustion processes.[26]

4.4.4.1.3 Installation of Energy Efficiency Options on the Dryer

Operating practices that increase energy efficiency are a potential control option for improving the fuel efficiency of the Biomass Boiler and therefore, providing benefit with respect to GHG emissions. In October 2010, the U.S. EPA provided a white paper that addresses control technologies, energy efficiency measures, and fuel switching options for industrial, commercial and institutional boilers. The energy efficiency options listed in the GHG BACT Guidance are:

- Burner replacement (for existing units)
- Boiler maintenance
- Boiler process control
- Condensate return
- Reduction of flue gas quantities
- Minimizing boiler blow down
- Reduction of excess air
- Selection of steam turbine

Since some of these boiler options do not apply to the wood-fire dryer, the energy efficient options were amended as necessary and the options considered for this analysis were:

- Burner efficiency; design efficiency
- Dryer maintenance
- Dryer process control
- Reduction of flue gas quantities
- Reduction/minimization of excess air
- Heat/Flue Gas Recovery
- Use of thermal oxidizers employing heat recovery (e.g., regenerative or recuperative thermal oxidizers)

EPA's GHG BACT Guidance for Pulp and Paper Industry was also considered when amending this list of energy efficient options since the paper addresses wood products and is the closest related industry to Enviva's operations. The paper addresses use of dryers and their energy efficient options.

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[26] EPA, Office of Air Quality Planning and Standards, "PSD and Title V Permitting Guidance for Greenhouse Gases", November 2010, p. 29.

4.4.4.2. Eliminate Technically Infeasible Options

4.4.4.2.1 Carbon Capture and Storage

While potentially available for certain high purity CO_2 streams, CCS is technically infeasible for the dryer for the following reasons:

Capture and Compression - Power Demand

CO_2 capture is achieved by separating CO_2 from emission sources where it is then recovered in a concentrated stream that can be sequestered. In a pre-combustion CO_2 capture scenario, the fuel is converted in a gasification plant into gaseous components. In this scenario the CO_2 can be captured before the gas is mixed with the air in a combustion turbine; thus in this instance the CO_2 stream is concentrated and at a high pressure.

Conversely, in a post-combustion capture scenario (such as would be necessary for the capture of CO_2 from the wood-fired dryer), CO_2 is exhausted in the flue gas at atmospheric pressure and a lower concentration relative to the pre-combustion capture scenario. The post-combustion CO_2 capture scenario is problematic because the low pressure and dilute concentration means a high volume of gas needs to be treated. Additional challenges stem from the impurities in the flue gas that tend to negatively affect the ability to adsorb CO_2,[27] and the compression of CO_2 would require a substantial auxiliary power load, resulting in additional fuel consumption (and additional CO_2, CH_4, and N_2O emissions) to generate the same amount of heat.[28]

Sequestration - Lack of Sequestration Sink (Geologic or Pipeline)

While capture-only technologies may be available and demonstrated on pilot scales, a remaining hurdle is the availability of a mechanism (pipeline or geologic formation) to permanently sequester the captured gas. As shown in the Interagency Report, there is no existing pipeline available in North Carolina for nearby CO_2 transport. The closest existing pipeline (partially completed with proposed extensions) is located hundreds of miles away in Mississippi and Louisiana.[29]

In 2009, the U.S. Department of Energy (DOE), National Energy Technology Laboratory granted the University of South Carolina funds for geologic characterization of the South Georgia Rift basin that extends from South Carolina into Georgia for CO_2 storage. This three year research period will begin with a geologic storage assessment and estimate of CO_2 storage capacity (ending in September 2013). Subsequent years of study will determine regional characterization of target CO_2 storage formation and finally site-specific characterization with installation of a test hole and evaluation of leakage pathways.[30,31] Since the availability and proximity of such geologic formations is unknown, carbon storage in the South Georgia Basin formation or any other candidate geologic sequestration site is not considered to be a technically feasible option for reducing CO_2 emissions from the dryer at this time.

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[27] Carbon Sequestration - CO_2 Storage, U.S. Department of Energy http://www.netl.doe.gov/technologies/carbon_seq/core_rd/co2capture.html.

[28] Report of the Interagency Task Force on Carbon Capture & Storage, August 2010, p. 29.

[29] Report of the Interagency Task Force on Carbon Capture & Storage, August 2010, Appendix B-1.

[30] http://www.netl.doe.gov/publications/factsheets/project/FE0001965.pdf

[31] Geologic Characterization of the South Georgia Rift Basin For Source Proximal CO_2 Storage, October 2010, http://www.netl.doe.gov/publications/proceedings/10/rcsp/presentations/Thur%20am/Brian%20Dressel/Waddell.2010%20South%20Carolina%20Partnerships%20Meeting%20Presentatio.pdf.

Based on the aforementioned technical challenges with capture, compression and storage of CO_2, CCS as a combined technology is not considered technically feasible as BACT for reducing CO_2 emissions from the dryer. Accordingly, CCS is eliminated as a potential control option in this BACT assessment for CO_2 emissions due to technical infeasibility.

4.4.4.2.2 Selection of the Lowest Carbon Fuel

Firing of a lower carbon fuel (natural gas) is a technically feasible option for CO_2 control. However, Enviva's overarching intention is to continue to use the abundant biomass at the Facility as the fuel for the dryer. In addition, biomass has been recognized by the EPA as a GHG beneficial fuel due to its renewable nature.

4.4.4.2.3 Installation of Energy Efficiency Options on the Wood-Fired Dryer

Each of the aforementioned energy efficiency options in Step 1 is technically feasible for CO_2e control of the dryer, with the exception of the use of thermal oxidizers employing heat recovery (e.g., regenerative or recuperative thermal oxidizers). An RTO is not being permitted as part of this application since Enviva has discussed in Section 4 of this application that the RTO technology will create NOx emissions (a problematic pollutant in North Carolina), is not cost effective, and is technically infeasible for the dryer system.

4.4.4.2.4 Rank Remaining Control Technologies by Effectiveness

Installation of energy efficient options is the remaining technically feasible control option for minimizing CO_2e emissions from the dryer. Installation of energy efficient options is evaluated in Step 4 of the BACT analysis.

4.4.4.3. Evaluate Most Effective Control Option (Impacts Analysis)

4.4.4.3.1 Selection of the Lowest Carbon Fuel

While natural gas may be a lower emitting carbon fuel than biomass, combustion of clean biomass (as a primary fuel), is a renewable fuel that has clean energy and GHG benefits, and has financial benefits to the facility in terms of cost reductions. This assertion is supported by U.S. EPA in the General GHG Permitting Guidance:

> *Even before EPA takes further action, however, permitting authorities may consider, when carrying out their BACT analyses for GHG, the environmental, energy and economic benefits that may accrue from the use of certain types of biomass and other biogenic sources (e.g., biogas from landfills) for energy generation, consistent with existing air quality standards. In particular, a variety of federal and state policies have recognized that some types of biomass can be part of a national strategy to reduce dependence on fossil fuels and to reduce emissions of GHGs.*

Enviva manufactures solid biomass fuels used by energy utilities to generate low-carbon, renewable energy. The combustion of biomass as a fuel is environmentally beneficial due to its nature as a renewable fuel. Reliance on natural gas as the primary fuel would reduce the GHG benefits delivered to Enviva's utility customers. Enviva measures and reports all GHG emissions associated with the production of its fuels to itscustomers. Natural gas is not an acceptable alternative to the wood fuel as it would increase the lifecycle greenhouse gas footprint of Enviva's fuels, reducing both their environmental and economic value. In addition, were the bark not used as a fuel source for the dryer, it would create a waste stream requiring disposal.

4.4.4.3.2 Installation of Energy Efficiency Options on the Wood-Fired Dryer

No adverse energy, environmental, or economic impacts are associated with energy efficient operating practices for reducing CO_2e emissions from the dryer. The environmental benefits include fuel savings and reduction of GHG emissions, as well as other criteria pollutant emissions, due to the efficiency gains.

4.4.4.4. Select BACT

Ultimately BACT will consist of a combination of best operating practices that implement energy efficient measures, which are detailed below.

TABLE 4-2. SUMMARY OF ENERGY EFFICIENCY OPTIONS FOR WOOD-FIRED DRYER[32]

Energy Efficiency Option	Features of Biomass Boiler
Efficient design; Efficient burners	The energy system is designed to convert virtually all of the fuel heating value to useful energy in the dryer. The energy system incorporates a state of the art control system which allows the operator to optimize the combustion process. Some of these features include the ability to maintain accurate moisture content control in the dryer, maintain proper air to fuel ratios throughout the firing range, and have controlled turndown in the combustion unit. The grate within the Heat Energy System consists of a multi-zone moving grate. This allows the final zone to move very slowly to allow complete carbon burnout within fuel, and thus dump mostly ash into the ash bin, allowing highest fuel utilization possible and minimal ash disposal.
Dryer maintenance	The conservative design of the dryer and energy system provides a drying system that requires less maintenance, provides more uptime, and has less air leakage to the dryer. This design allows the dryer to rotate at a slow speed which minimizes dryer seal maintenance. All manufacture O&M guidelines for maintenance will be strictly adhered to via Enviva's maintenance program.
Dryer process control	The control system is an integrated control system that monitors multiple key temperatures which in turn optimizes the combustion process and thus minimizes the amount of exhaust gases to the environment.
Reduction of flue gas quantities	The dryer inlet and outlet air locks have machined metal rotors and housings which minimize the amount of air leakage into the dryer. The dryer has a low pressure drop design and tight tolerance metallic seals which reduce the potential for uncontrolled air leakage in the system. The dryer system is also designed to recycle a significant gas volume to the furnace as well as the dryer inlet. At 50% MCWB, the moisture content of

[32] Provided to Gina Hicks and Aimee Andrews (Trinity) from Norb Hintz (Enviva) via email on June 10, 2014.

Energy Efficiency Option	Features of Biomass Boiler
	the exhaust gases is higher than 0.51 lbs of water per pound of dry air. Due to the large amount of heating surface area in the dryer, the dryer rotates at slow speeds, which minimizes dryer seal infiltration.
Reduction of excess air	Best practices are employed with variable speed fans coupled with automatic control of dampers for combustion air and an automatic control of dryer recycle to the furnace. This tight control minimizes oxygen swings and provides a very stable combustion process. The fuel handling system reliability keeps the fuel infeed rate aligned with the proper air flow to optimize the overall combustion process.
Improved dryer insulation	The dryer insulation package is designed to operate in the cold wet environments typically experienced in the Southeastern USA. The insulation lagging is designed to protect the insulation from moisture infiltration, but if it occurs, the insulation is designed to drain and not absorb the moisture. The outer temperature of the lagging is designed to be less than 140°F, and in most places the surface temperature is calculated to be around 120°F.
Flue gas heat recovery/RTO heat recovery	This option is not feasible for this dryer application. VOC's in the dryer exhaust stream condense on the heat exchange surfaces and cause blockage in the heat exchanger. This has been attempted at other sites and was not successful due to the blocking of the air passages and subsequent loss of heat transfer. Heat cannot be recovered from a thermal device such as an RTO since one will not be installed as part of this project. An RTO is not being permitted as part of this application since Enviva has demonstrated that the RTO technology will create NOx emissions (a problematic pollutant in North Carolina), is not cost effective, and is technically infeasible for the dryer system.

Enviva proposes that the GHG BACT be demonstrated by implementing the energy efficient best operating practices discussed above.

4.5. GREEN WOOD HAMMERMILLS VOC ANALYSIS

The control technology assessment for VOC emitted and subject to PSD review is provided below. PM review is discussed in Section 4.6

4.5.1. Volatile Organic Compounds (VOC)

VOC emissions are released during the green hammermill process due to the heat generated by mechanical milling of the dried wood.

4.5.1.1. Identify Control Technologies

VOC emissions can be controlled by VOC add-on oxidation technologies. Based upon a search of RBLC results and commercially demonstrated technology, the following control technologies are considered in this evaluation:

- Regenerative thermal oxidation (RTO),
- Regenerative catalytic oxidation (RCO),
- Thermal Catalytic Oxidation (TCO),
- Packed-Bed Catalytic Wet Scrubber, and
- Bio-oxidation / Bio-filtration.

REGENERATIVE THERMAL OXIDATION: RTOs use a high-density media such as a ceramic-packed bed still hot from a previous cycle to preheat an incoming VOC-laden waste gas stream. The preheated, partially oxidized gases then enter a combustion chamber where they are heated by auxiliary fuel (natural gas) combustion to a final oxidation temperature typically between 760 to 820 °C (1400 to 1500 °F) and maintained at this temperature to achieve maximum VOC destruction. The purified, hot gases exit this chamber and are directed to one or more different ceramic-packed beds cooled by an earlier cycle. Heat from the purified gases is absorbed by these beds before the gases are exhausted to the atmosphere. The reheated packed-bed then begins a new cycle by heating a new incoming waste gas stream.

REGENERATIVE CATALYTIC OXIDATION: Regenerative catalytic oxidation (RCO) technology is widely used in the reduction of VOC emissions. It operates in the same fashion as the RTO, but it requires only moderate reheating to the operating range of the catalyst, approximately 450 °F. Furthermore, RCOs can achieve a high thermal efficiency of 95% because they utilize a ceramic bed to recapture the heat of the stream exiting the combustion zone. Particulate control must be placed upstream of an RCO.

THERMAL CATALYTIC OXIDATION: Operating much in the same fashion as an RCO, thermal catalytic oxidation (TCO), passes heated gases through a catalyst without the regenerative properties attributed by the ceramic bed used to recapture heat.

PACKED-BED CATALYTIC WET SCRUBBER: This technology is reportedly able to reduce overall VOC emissions by approximately 30 percent.

BIO-OXIDATION / BIO-FILTRATION: Bio-filtration offers an alternative to thermal or catalytic units. It is an air pollution control technology – offering upwards of 80% or more control efficiency – in which VOCs are oxidized using living micro-organisms on a media bed (sometimes referred to a "bioreactor"). A fan is typically used to collect or draw contaminated air from a building or process. If the air is not properly conditioned (heat, humidity, solids), then pre-treatment may be a necessary step to obtain optimum gas stream conditions before introducing it into the bioreactor. As the emissions flow through the bed media, the pollutants are absorbed by moisture on the bed media and come into contact with the microbes. The microbes consume and metabolize the excess organic pollutants, converting them into CO_2 and water, much like a traditional oxidation process.

"Mesophilic" microbes are typically used in these systems. Mesophilic microbes can survive and metabolize VOC materials at conditions up to 110°F to 120°F.

4.5.1.2. Eliminate Technically Infeasible Options

As indicated in the previous subsection, there are a variety of combustion techniques that can be used to control VOC. However, the following technologies are not practical for VOC control at the Enviva plant:

- Packed Bed Catalytic Scrubber, and
- Bio-oxidation / Bio-filtration,
- Thermal Catalytic Oxidation (TCO).

Packed Bed Wet Scrubber: This technology is still in an early mode of operation at its first full-scale demonstration in Moncure, NC. Until the technology can demonstrated to operate reliably with an established VOC control efficiency over an extended period of time, this technology is not considered to be a feasible control technology.

Bio-oxidation / Bio-filtration: In the case of bio-oxidation or bio-filtration, many questions still remain on the technology's efficacy to effectively remove VOC and HAP emissions at the Enviva plant.

To our knowledge, use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Due to the undemonstrated nature of this technology at a pellet manufacturing facility, it has been eliminated from further consideration in this BACT analysis.

4.5.1.3. Rank Remaining Control Technologies by Effectiveness

After eliminating technically infeasible control options, Enviva has determined the following options remain and has ranked them in order of greatest to least control of VOC emissions:

- Regenerative thermal oxidation (RTO) designed for 90% control
- Regenerative catalytic oxidation (RCO) designed for 90% control

4.5.1.4. Evaluate Most Effective Control Option (Impacts Analysis)

4.5.1.4.1 Regenerative Thermal Oxidation (0.027 lb/ODT VOC)

Economic Impacts

Results of the economic impacts evaluation for operation of the RTO are presented in Tables D-11 and D-13. Capital and operating costs are based on vendor quotes, OAQPS Manual, and incremental baghouse capital and annual operating cost. Other cost impacts are estimated using EPA cost methodologies. Table D-11 presents a breakout of costs used in the economic impacts evaluation.

As shown in Tables D-13, the cost-effectiveness of operation of the RTO is approximately $9,813/ton VOC, which is considered cost prohibitive.

Energy Impacts

The additional energy required to operate the RTO is about 1.13 x 10^6 KWH/yr.

Environmental Impacts

There are adverse impacts from the operation of an RTO in the form of increased emissions of criteria pollutants, particularly NO_x, and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.5.1.4.2 Regenerative Catalytic Oxidation (0.027 lb/ODT VOC)

Economic Impacts

Results of the economic impacts evaluation for operation of the RCO are presented in Tables D-12 and D-13. Capital and operating costs are based on vendor quotes, OAQPS Manual, and incremental baghouse capital and annual operating cost. Other cost impacts are estimated using EPA cost methodologies. Table D-12 presents a breakout of costs used in the economic impacts evaluation.

As shown in Tables D-15, the cost-effectiveness of operation of the RCO is approximately $10,731/ton VOC, which is considered cost prohibitive.

Energy Impacts

The additional energy required to operate the RCO is about 3.24 x 10^5 KWH/yr.

Environmental Impacts

There are adverse impacts from the operation of an RCO in the form of increased emissions of criteria pollutants, particularly NO_x, and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.5.1.5. Select BACT

Since the RTO and RCO abatement technology are deemed cost prohibitive, the plant will utilize good operating and maintenance procedures to achieve the proposed BACT of 0.27 lb/ODT.

4.6. DRY HAMMERMILLS/ HAMMERMILL AREA BAGHOUSE/ GREEN WOOD HAMMERMILLS / PELLET MILL FEED SILO/ PELLET MILL FINES BIN/ DRY WOOD HANDLING/ FINISHED PRODUCT HANDLING

4.6.1. Particulate Matter (TSP/PM_{10})

TSP/PM_{10}/$PM_{2.5}$ emissions from the green wood hammermills, dry hammermills, hammermills area, dried wood handling, pellet mill feed silo, pellet mill fines bin, and finished product handling sources will be controlled with fabric filtration or bin vent filtration systems. These filters are capable of achieving the lowest achievable emission rates of potentially applicable particulate matter control devices for filterable PM. The proposed PM /PM_{10}/$PM_{2.5}$ BACT for the green wood hammermills, pellet mill feed silo, pellet mill fines bin, and dry wood handling, is based on an outlet grain loading factor of 0.004 gr/cf, which approaches the lowest emission levels reliably achieved using fabric filter control. For the dry hammermills and finished product, since speciation is known for the $PM_{2.5}$, the proposed PM /PM_{10}/$PM_{2.5}$ BACT is 0.004/ 0.004/ 0.000014 gr/cf using fabric filter control and available PM speciation.

4.7. DRY HAMMERMILLS VOC ANALYSIS

4.7.1. Volatile Organic Compounds (VOC)

In addition to particulate emissions, some VOC emissions will be emitted from the dry hammermills.

4.7.1.1. Identify Control Technologies

VOC emissions can be controlled by VOC add-on oxidation technologies. Based upon a search of RBLC results and commercially demonstrated technology, only the following control technologies are considered in this evaluation:

- Regenerative thermal oxidation (RTO),
- Regenerative catalytic oxidation (RCO),
- Thermal Catalytic Oxidation (TCO),
- Packed-Bed Catalytic Wet Scrubber, and
- Bio-oxidation / Bio-filtration.

REGENERATIVE THERMAL OXIDATION: RTOs use high-density media such as a ceramic-packed bed still hot from a previous cycle to preheat an incoming VOC-laden waste gas stream. The preheated, partially oxidized gases then enter a combustion chamber where they are heated by auxiliary fuel (natural gas) combustion to a final oxidation temperature typically between 760 to 820 °C (1400 to 1500 °F) and maintained at this temperature to achieve maximum VOC destruction. The purified, hot gases exit this chamber and are directed to one or more different ceramic-packed beds cooled by an earlier cycle. Heat from the purified gases is absorbed by these beds before the gases are exhausted to the atmosphere. The reheated packed-bed then begins a new cycle by heating a new incoming waste gas stream.

REGENERATIVE CATALYTIC OXIDATION: Regenerative catalytic oxidation (RCO) technology is widely used in the reduction of VOC emissions. It operates in the same fashion as the RTO, but it requires only moderate reheating to the operating range of the catalyst, approximately 450 °F. Furthermore, RCOs can achieve a high thermal efficiency of 95% because they utilize a ceramic bed to recapture the heat of the stream exiting the combustion zone. Particulate control must be placed upstream of an RCO.

THERMAL CATALYTIC OXIDATION: Operating much in the same fashion as an RCO, thermal catalytic oxidation (TCO), passes heated gases through a catalyst without the regenerative properties attributed by the ceramic bed used to recapture heat.

PACKED-BED CATALYTIC WET SCRUBBER: This technology is reportedly able to reduce overall VOC emissions by approximately 30 percent.

BIO-OXIDATION / BIO-FILTRATION: Bio-filtration offers an alternative to thermal or catalytic units. It is an air pollution control technology – offering upwards of 80% or more control efficiency – in which VOCs are oxidized using living micro-organisms on a media bed (sometimes referred to as a "bioreactor"). A fan is typically used to collect or draw contaminated air from a building or process. If the air is not properly conditioned (heat, humidity, solids), then pre-treatment may be a necessary step to obtain optimum gas stream conditions before introducing it into the bioreactor. As the emissions flow through the bed media, the pollutants are absorbed by moisture on the bed media and come into contact with the microbes. The microbes consume and metabolize the excess organic pollutants, converting them into CO_2 and water, much like a traditional oxidation process.

"Mesophilic" microbes are typically used in these systems. Mesophilic microbes can survive and metabolize VOC materials at conditions up to 110°F to 120°F.

4.7.1.2. Eliminate Technically Infeasible Options

As indicated in the previous subsection, there are a variety of combustion techniques that can be used to control VOC. However, the following technologies are not practical for VOC control at the Enviva plant:

- Packed Bed Catalytic Scrubber, and
- Bio-oxidation / Bio-filtration,
- Thermal Catalytic Oxidation (TCO).

PACKED BED WET SCRUBBER: This technology is still within an early mode of operation at its first full-scale demonstration in Moncure, NC. Until the technology can demonstrated to operate reliably with an established VOC control efficiency over an extended period of time, this technology is not considered to be a clearly feasible control technology.

BIO-OXIDATION / BIO-FILTRATION: In the case of the bio-oxidation or bio-filtration, many questions still remain on the technology's efficacy to effectively remove VOC and HAP emissions at the Enviva plant.

To our knowledge, use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Due to the undemonstrated nature of this technology at a pellet manufacturing facility, it has been eliminated from further consideration in this BACT analysis.

4.7.1.3. Rank Remaining Control Technologies by Effectiveness

After eliminating the technically infeasible control options, Enviva has determined the following options remain and has ranked them in order of greatest to least control of VOC emissions:

- Regenerative thermal oxidation (RTO) designed for 90% control efficiency with additional PM control (baghouse).
- Regenerative catalytic oxidation (RCO) designed for 90% control efficiency with upgraded PM control (baghouse).

4.7.1.4. Evaluate Most Effective Control Option (Impacts Analysis)

4.7.1.4.1 Regenerative Thermal Oxidation (0.024 lb/ODT VOC)

Economic Impacts

Results of the economic impacts evaluation for operation of the RTO are presented in Tables D-15 and D-17. Capital and operating costs are based on vendor quotes and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. Table D-17 presents a breakout of costs used in the economic impacts evaluation.

As shown in Tables D-16, the cost-effectiveness of operation of the RTO is approximately $52,643/ton VOC, which is considered cost prohibitive.

Energy Impacts

The additional energy required to operate the RTO is about 4.4 x 10^6 KWH/yr.

Environmental Impacts

There are adverse impacts from the operation of an RTO in the form of increased emissions of criteria pollutants and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.7.1.4.2 Regenerative Catalytic Oxidation (0.024 lb/ODT VOC)

Economic Impacts

Results of the economic impacts evaluation for operation of the RCO are presented in Tables D-16 and D-17. Capital and operating costs are based on vendor quotes and OAQPS Manual. Other cost impacts are estimated using EPA cost methodologies. Table D-17 presents a breakout of costs used in the economic impacts evaluation. A detailed discussion of key cost estimates is provided in the following text.

As shown in Table D-16, the cost-effectiveness of operation of the RCO is approximately $41,981/ton VOC, which is considered cost prohibitive.

Energy Impacts

The additional energy required to operate the RCO is about 1.41 x 10^6 KWH/yr.

Environmental Impacts

There are adverse impacts from the operation of an RCO in the form of increased emissions of criteria pollutants, particularly NO_x, and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.7.1.5. Select BACT

Since the RTO and RCO abatement technologies are deemed cost prohibitive, the plant will utilize good operating and maintenance procedures to achieve the proposed BACT of 0.24 lb/ODT on an annual average basis.

4.8. PELLET COOLERS

The pellet presses discharge formed pellets through one of six pellet coolers. 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 high efficiency cyclones operating in parallel (one for every cooler) prior to discharge to the atmosphere. The control technology assessment for each compound subject to PSD review is provided below.

4.8.1. Particulate Matter (TSP/PM_{10})

Particulate matter (TSP/PM_{10}/$PM_{2.5}$) is emitted as both filterable and condensable particulate matter. As stated earlier, Enviva has designed the pellet coolers to have one high efficiency cyclone operating per pellet cooler prior to discharge to the atmosphere. However in order to effectively evaluate all options, baseline emissions are based on no control of particulate matter.

4.8.1.1. Identify Control Technologies

Potentially applicable PM add-on control technologies are:

- Cyclones,
- Baghouse, and
- Electrostatic Precipitator (ESP).

Cyclone/ Multiclone: Cyclone separators, which can be arranged in series as a multiclone, remove solids from the air stream by application of centrifugal force. Typically, the particle-laden gas enters the top of the cyclone tangentially to the barrel, which causes the gas to spin inside the device. Because of the shape of the device, the gas turns and forms a vortex in the center of the device as it moves upward to the exit duct. The particles are removed by centrifugal force, which drives them to the wall of the collector where they fall to the bottom due to gravity. Cyclones are efficient in removing larger, denser particles but are not as effective for fine particle removal (less than 10 μm diameter).

Baghouse: A fabric filtration device (baghouse) consists of a number of filtering elements (bags) along with a bag cleaning system contained in a main shell structure incorporating dust hoppers. Fabric filters use fabric bags as filters to collect particulate matter. The particulate-laden gas enters a fabric filter compartment and passes through a layer of particulate and filter bags. The collected particulate forms a cake on the bag, which enhances the bag's filtering efficiency. However, excessive caking will increase the pressure drop across the fabric filter and reduce its efficiency.

Electrostatic Precipitator: Electrostatic precipitators (ESPs) remove particles from a gas stream through the use of electrical forces. Discharge electrodes apply a negative charge to particles passing through a strong electrical field. These charged particles then migrate to a collecting electrode having an opposite, or positive, charge. Collected particles are removed from the collecting electrodes by periodic mechanical rapping.

4.8.1.2. Eliminate Technically Infeasible Options

Baghouses and ESPs are both technically feasible. However, since baghouses can generally be designed to be as efficient as ESPs, only baghouse control was considered in the analysis. Evaluation of baghouse controls was considered logical to allow for a side-by-side comparison of the cyclone to baghouse control options evaluated in the BACT evaluation. It is important to note there is some risk of explosion associated with the installation of a baghouse on this type of technology.

4.8.1.3. Rank Remaining Control Technologies by Effectiveness

After eliminating the technically infeasible control options, Enviva has determined the following options remain and has ranked them in order of greatest to least control of particulate matter emissions:

- Baghouse designed for 97% control efficiency for PM.
- Cyclone designed for 90% control efficiency for PM.

4.8.1.4. Evaluate Most Effective Control Option (Impacts Analysis)

4.8.1.4.1 Baghouse (0.0066 gr/cf TSP, 0.0017 g/cf PM_{10}, 0.00021 gr/cf $PM_{2.5}$)

Economic Impacts

Results of the economic impacts evaluation for operation of the baghouse on the pellet coolers are presented in Tables D-21a, b and c. Three separate tables present the cost impacts evaluations for PM, PM_{10}, and $PM_{2.5}$ particle size fractions. Capital and operating costs are based on vendor quotes, OAQPS Manual, and past permitting experience

As shown in Tables D-20a, b, and c the cost-effectiveness of operation of the a baghouse compared with the use of using cyclones has an incremental cost effectiveness of $24,098/ton PM, $92,776 /ton PM_{10}, and $757,353 ton $PM_{2.5}$ which is considered cost prohibitive.

Energy Impacts

The additional energy required to operate the baghouse about 1.2 x 10^6 KWH/yr.

Environmental Impacts

There are no adverse impacts from the operation of baghouse.

4.8.1.4.2 Cyclones (0.022 gr/cf TSP, 0.0057 g/cf PM_{10}, 0.0007 gr/cf $PM_{2.5}$)

Economic Impacts
Results of the economic impacts evaluation for operation of the cyclones on the pellet coolers are presented in Tables D-21a, b and c. Three separate tables evaluate the cost effectiveness for PM, PM_{10}, and $PM_{2.5}$. Capital and operating costs are based on vendor quotes, the OAQPS Manual, and past permitting experience

As shown in Tables D-21a, b, and c the cost-effectiveness of operation of the cyclones is $188/ton PM, $724/ton PM_{10}, and $5,897/ton $PM_{2.5}$ which is not considered cost prohibitive.

Energy Impacts
The additional energy required to operate the cyclones is about 1.2×10^6 KWH/yr.

Environmental Impacts
There are no adverse impacts from the operation of cyclones as BACT.

4.8.1.5. Select BACT

The proposed BACT emission rate for the pellet cooler cyclones is 0.022 gr PM/cf, 0.0057 gr PM_{10}/cf, and 0.0007 gr $PM_{2.5}$/cf. These levels are considered near the lowest levels reliably achieved via cyclone control.[33]

4.8.2. Volatile Organic Compounds (VOC)

VOC emissions are released during the pelletization and cooling process due to the heat generated by mechanical compression during compression.

4.8.2.1. Identify Control Technologies

VOC emissions can be controlled by VOC add-on oxidation technologies. Based upon a search of RBLC results and commercially demonstrated technology, only the following control technologies are considered in this evaluation:

- Regenerative thermal oxidation (RTO),
- Regenerative catalytic oxidation (RCO),
- Thermal Catalytic Oxidation (TCO),
- Packed-Bed Catalytic Wet Scrubber, and
- Bio-oxidation / Bio-filtration.

REGENERATIVE THERMAL OXIDATION: RTOs use high-density media such as a ceramic-packed bed still hot from a previous cycle to preheat an incoming VOC-laden waste gas stream. The preheated, partially oxidized gases then enter a combustion chamber where they are heated by auxiliary fuel (natural gas) combustion to a final oxidation temperature typically between 760 to 820 °C (1400 to 1500 °F) and maintained at this temperature to achieve maximum VOC destruction. The purified, hot gases exit this chamber and are directed to one or more different ceramic-packed beds cooled by an earlier cycle. Heat

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[33] Air & Waste Management Association, Table 4 - Cyclone and Fabric Filter Performance, "Air Pollution Control Manual," 2000.

from the purified gases is absorbed by these beds before the gases are exhausted to the atmosphere. The reheated packed-bed then begins a new cycle by heating a new incoming waste gas stream.

Regenerative Catalytic Oxidation: Regenerative catalytic oxidation (RCO) technology is widely used in the reduction of VOC emissions. It operates in the same fashion as the RTO, but it requires only moderate reheating to the operating range of the catalyst, approximately 450 °F. Furthermore, RCOs can achieve a high thermal efficiency of 95% because they utilize a ceramic bed to recapture the heat of the stream exiting the combustion zone. Particulate control must be placed upstream of an RCO.

Thermal Catalytic Oxidation: Operating much in the same fashion as an RCO, thermal catalytic oxidation (TCO), passes heated gases through a catalyst without the regenerative properties attributed by the ceramic bed used to recapture heat.

Packed-Bed Catalytic Wet Scrubber: This technology is reportedly able to reduce overall VOC emissions by approximately 30 percent.

Bio-oxidation / Bio-filtration: Bio-filtration offers an alternative to thermal or catalytic units. It is an air pollution control technology – offering upwards of 80% or more control efficiency – in which VOCs are oxidized using living micro-organisms on a media bed (sometimes referred to as a "bioreactor"). A fan is typically used to collect or draw contaminated air from a building or process. If the air is not properly conditioned (heat, humidity, solids), then pre-treatment may be a necessary step to obtain optimum gas stream conditions before introducing it into the bioreactor. As the emissions flow through the bed media, the pollutants are absorbed by moisture on the bed media and come into contact with the microbes. The microbes consume and metabolize the excess organic pollutants, converting them into CO_2 and water, much like a traditional oxidation process.

"Mesophilic" microbes are typically used in these systems. Mesophilic microbes can survive and metabolize VOC materials at conditions up to 110°F to 120°F.

4.8.2.2. Eliminate Technically Infeasible Options

As indicated in the previous subsection, there are a variety of combustion techniques that can be used to control VOC. However, the following technologies are not practical for VOC control at the Enviva plant:

- Packed Bed Catalytic Scrubber,
- Bio-oxidation / Bio-filtration, and
- Thermal Catalytic Oxidation (TCO).

Packed Bed Wet Scrubber: This technology is still in an early startup mode of operation at its first full-scale demonstration in Moncure, NC. Until the technology can be demonstrated to operate reliably with an established VOC control efficiency over an extended period of time, this technology is not considered to be a feasible control technology.

Bio-oxidation / Bio-filtration: In the case of bio-oxidation or bio-filtration, many questions still remain on the technology's efficacy to remove effectively VOC and HAP emissions at the Enviva plant.

To our knowledge, use of this technology has not been demonstrated in practice at a pellet manufacturing facility. Due to the undemonstrated nature of this technology at a pellet manufacturing facility, it has been eliminated from further consideration in this BACT analysis.

4.8.2.3. Rank Remaining Control Technologies by Effectiveness

After eliminating the technically infeasible control options, Enviva has determined the following options remain and has ranked them in order of greatest to least control of VOC emissions:

- Regenerative thermal oxidation (RTO) designed for 90% control efficiency with additional PM control (baghouse).
- Regenerative catalytic oxidation (RCO) designed for 90% control efficiency with upgraded PM control (baghouse).

4.8.2.4. Evaluate Most Effective Control Option (Impacts Analysis)

As demonstrated in Section 4.5.1, baghouse control on the pellet coolers was determined to not be cost effective based on incremental cost effectiveness over cyclone control. However, in order to consider additional VOC control using either an RTO or RCO, additional PM reduction is required to prevent catalyst blinding in an RCO and media plugging in either an RCO or RTO. Therefore, use of RCO and RTO on the pellet coolers is presumed to require use of bagfilter instead of cyclones for improved PM control to protect the operational stability of the RCO and RTO. In order to account for this required upgrade, the incremental capital and annual operating costs for use of bagfilters instead of cyclones has been added to the capital and annual operating costs of RTO and RCO controls. Please refer to the PM BACT analysis for the pellet coolers for calculation of capital and operating costs of bagfilter and cyclone controls.

4.8.2.4.1 Regenerative Thermal Oxidation (0.08 lb/ODT VOC)

Economic Impacts

Results of the economic impacts evaluation for operation of the RTO are presented in Tables D-22 and D-24. Capital and operating costs are based on vendor quotes, the OAQPS Manual, and incremental baghouse capital and annual operating cost. Other cost impacts are estimated using EPA cost methodologies. Table D-24 presents a breakout of costs used in the economic impacts evaluation. .

As shown in Table D-24, the cost-effectiveness of operation of the RTO is approximately $11,945/ton VOC, which is considered cost prohibitive.

Energy Impacts

The additional energy required to operate the RTO is about 4.3 x 10^6 KWH/yr.

Environmental Impacts

There are adverse impacts from the operation of an RTO in the form of increased emissions of criteria pollutants, particularly NO_x, and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.8.2.4.2 Regenerative Catalytic Oxidation (0.08 lb/ODT VOC)

Economic Impacts

Results of the economic impacts evaluation for operation of an RCO are presented in Tables D-23 and D-24. Capital and operating costs are based on vendor quotes, OAQPS Manual, and incremental baghouse capital and annual operating cost. Other cost impacts are estimated using EPA cost methodologies. Table D-24 presents a breakout of costs used in the economic impacts evaluation. A detailed discussion of key cost estimates is provided in the following text.

As shown in Table D-24, the cost-effectiveness of operation of the RCO is approximately $11,233/ton VOC, which is considered cost prohibitive.

Energy Impacts
The additional energy required to operate the RCO is about 1.48 x 10^6 KWH/yr.

Environmental Impacts
There are adverse impacts from the operation of an RTO in the form of increased emissions of criteria pollutants, particularly NO_x, and GHGs emitted as by-products of natural gas used for supplemental fuel and actual VOC destruction.

4.8.2.5. Select BACT

Since the RTO and RCO abatement technologies are deemed cost prohibitive, the plant will utilize good operating and maintenance procedures to achieve the proposed BACT of 0.85 lb/ODT on an annual average basis.

4.9. LOG BARK HOG/ LOG CHIPPING/ DIESEL STORAGE TANKS

VOC emissions from these emission sources are considered fugitive emissions and add on emission controls are not practicable. There are no known good operating practices that would reduce emissions. Therefore, no control is proposed for VOC emissions for these emission sources.

4.10. GREEN WOOD HANDLING & STORAGE PILE- PM, PM_{10}, $PM_{2.5}$, VOC

PM/PM_{10}/$PM_{2.5}$ emissions from the storage pile and handling are considered fugitive source emissions. As presented in emission calculations in this application, PM emissions from the green wood storage piles and green wood handling are negligible due to the high inherent moisture content of green wood. Thus use of water sprays or chemical suppressants is unnecessary and would result in notable increases in emissions of criteria pollutants from the dryer due to combustion of additional fuel to remove the additional moisture that would be added.

In addition to particulate emissions, fugitive VOC will be emitted. There are no practicable methods for reduction of VOC emissions from these sources.

4.11. ROADS – PM, PM_{10}, $PM_{2.5}$

Raw material delivery, pellet loadout, and employee traffic will result in fugitive particulate matter emissions from paved roads at the site.

Based on observation at other Enviva facilities, it is anticipated that watering of paved roads is generally unnecessary due to low soil loading; however, Enviva proposes to water areas of paved roads as needed. This technique reduces emissions by an estimated 90 percent as documented in the emission calculations in Appendix B and is proposed as BACT for paved roads.

4.12. EMERGENCY FIRE PUMP & EMERGENCY GENERATOR

A 250 hp emergency generator and 250 hp fire pump will be installed as part of this project. Each diesel-fired engine will be certified to meet the emissions standards of NSPS Subpart IIII. All engines will be fired with only ultra-low sulfur diesel (ULSD) with a maximum sulfur content of 0.0015 weight percent (15 ppmw).

The following NSPS emission limits will apply to proposed two emergency engines and effectively set the floor for BACT for these units for certain pollutants:

- CO limit of 3.5 g/KW-hr
- PM limit of 0.20 g/kW-hr
- NMHC + NOX limit of 4.0 g/kW-hr

Other than for use during emergency service, the emergency fire pump and emergency generator engines are limited to a maximum of 100 hours per year of operation for maintenance and readiness testing under the NSPS standards of Subpart IIII. Enviva will use non-resettable hour meters to monitor and record the monthly engine operation to ensure non-emergency operation does not exceed 100 hours for each rolling 12-month period.

Add-on controls for the fire pump and generator are impractical given the intermittent operation of these sources. Accordingly, Enviva proposes BACT for CO, PM, and NMHC+ NOx these engines to be good combustion practices (i.e., operate under manufacturer's guidance), to ensure compliance with all applicable requirements of NSPS Subpart IIII for the fire pump and generator, including the use of low sulfur fuel, and to limit annual non-emergency operation to 100 hours per year per engine. No specific emission limits beyond those required by NSPS Subpart IIII are necessary.

GHG emissions will be limited by restricting the use of the NSPS-compliant engines to maintenance, readiness testing and emergency use only. The only appropriate method of reducing GHG emissions is selection of fuel-efficient engines, which obviously minimizes CO_2, CH_4, and N_2O emissions. Since new, NSPS-compliant engines will be utilized, the engines will be fuel efficient. Since ultimate engine selection must necessarily take into account reliability in emergency operation, instead of a specific emissions standard, Enviva proposes a work practice standard of limiting operation of the engines to maintenance, readiness testing and emergency use only.

4.13. SUMMARY OF PROPOSED BACT EMISSIONS LIMITS

Table 4-3: Proposed BACT Table

Source	Pollutant	Control/Operation	Proposed Emission Limit	Emission Limit Units
Dryer System	NO_x	Good combustion practices; burner design	0.200	lb/MMBtu
	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Cyclones + WESP	0.105	lb/ODT
	VOC	Process Design	1.07	lb/ODT (annual)
	CO	Process Design	0.21	~~lb/ODT~~ lb/MMBtu
Green Wood Hammermills	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
	VOC	Good operating & maintenance procedures	0.27	lb/ODT (annual)
Hammermill Area	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
Dry Hammermills	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Cyclones + Fabric Filter	0.004/ 0.004/ .000014	gr/cf
	VOC	Process Design	0.24	lb/ODT (annual)
Pellet Mill Feed Silo	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
Pellet Mill Fines Bin	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Bin Vent Filter	0.004	gr/cf
Final Product Handling	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Fabric Filter	0.004/ 0.004/ .000014	gr/cf
Pellet Coolers	TSP/PM_{10}/$PM_{2.5}$ (filterable)	Cyclones	0.022/ 0.0057/ 0.0007	gr/cf
	VOC	Process Design	0.85	lb/ODT (annual)
Log Bark Hog	VOC	Fugitive - N/A	N/A	N/A
Chipper	VOC	Fugitive - N/A	N/A	N/A
Storage Tanks	VOC	Fugitive - N/A	N/A	N/A
Green Wood Handling	TSP/PM_{10}/$PM_{2.5}$	Inherent Moisture	N/A	N/A
Storage Piles	TSP/PM_{10}/$PM_{2.5}$	Inherent Moisture	N/A	N/A
	VOC	Fugitive - N/A	N/A	N/A
Roads	TSP/PM_{10}/$PM_{2.5}$	Paving & Water Spray	N/A	N/A
Emergency Generator	All Pollutants	NSPS Certification	N/A	N/A
Firewater Pump	All Pollutants	NSPS Certification	N/A	N/A
Backup Chipper	All Pollutants	NSPS Certification	N/A	N/A