Prepared for:

NORTH CAROLINA RENEWABLE POWER - LUMBERTON, LLC
1866 Hestertown Road
Lumberton, NC 28359

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Air Permits Section

PSD PERMIT APPLICATION
North Carolina Renewable Power – Lumberton, LLC
Lumberton, North Carolina

Prepared by:

EPS

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Atlanta, Georgia 30338
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March 2017

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APPENDICES

1 INTRODUCTION

North Carolina Renewable Power - Lumberton, LLC (NCRP) took ownership of the Lumberton Energy, LLC cogeneration power plant located at 1866 Hestertown Road, Lumberton (Robeson County) in January 2015. At the time, the facility had not operated since 2009. The facility consisted of two (2) identical stoker boilers (Emission Source ID Nos. ES-1A and ES-1B), one steam turbine generator and ancillary equipment. The boilers were permitted to burn coal, natural gas, No. 2 and No. 4 fuel oil, tire derived fuel (TDF), pelletized paper fuel, flyash briquette, and non-Commercial and Industrial Solid Waste Incineration (CISWI) wood. On February 20, 2015, NCRP was issued the NCDAQ Permit No. 05543T20 to reflect the change of ownership.

On March 19, 2015, NCRP applied to modify the permit to remove coal, No. 2 and No. 4 fuel oil, TDF, pelletized paper, and flyash briquettes from the fuel mix and add poultry litter as an alternate fuel. Low sulfur fuel oil is still used a t the boilers for limited startup purposes. Based on emission estimates that were developed using stack test data from a similar facility, NCRP requested PSD synthetic minor limits of less than 250 tons per year for NOx, CO, and SO_2. NCDAQ issued Permit No. 05543T21 on May 29, 2015 to modify the facility's permit accordingly. Additionally, Permit No. 05543T22 was issued on June 12, 2015 to correct a typographical error.

On July 7, 2015, the boilers were restarted, firing on non-CISWI wood only, and on October 16, 2015 poultry litter was added to the fuel mix for the first time. After restarting the boilers, NCRP discovered that the CO emissions were considerably higher than anticipated. Because the cumulative CO emissions approached the 250 tpy CO emissions limit, the COMPANY voluntarily shut down the BOILERS on March 7, 2016. On August 1, 2016, the North Carolina Environmental Management Commission ("EMC") approved a Special Order By Consent that allowed NCRP to restart the boilers following the completion of various, specified boiler maintenance ("First SOC"). NCRP conducted the specified maintenance and restarted the boilers on August 13, 2016. CO emissions from the boilers continued to by higher than expected following completion of the maintenance and on February 27, 2017, the EMC approved a second Special Order By Consent (the "Later SOC") that required submittal of a PSD permit application within 60 days of the effective date of the Later SOC. This PSD application was prepared and submitted in accordance with the Later SOC.

1.1 PSD Applicability

Prior to submittal of the March 2015 permit application in which the PSD synthetic minor limits were requested, the facility was classified as a PSD major source. Therefore, any PSD pollutants with emissions increases that equal or exceed the PSD significant emission rates (SERs) are subject to PSD review. Table 1.1 on the following page summarizes the emissions increases associated with the modification of the boilers authorized by Permit No. 05543T21 (*i.e.*, the addition of poultry litter and removal of coal, TDF, and other materials from the fuel mix) and PSD applicability. Detailed calculations are provided in Appendix B.

Table 1.1 PSD Applicability

Pollutant	Baseline Actual Emissions* (ton/yr)	Projected Actual Emissions (ton/yr)	Emissions Increases (ton/yr)	PSD Major Modification Threshold (ton/yr)
CO	5.75	847.53	841.78	100
NO_x	70.20	235.43	165.23	40
SO_2	170.90	421.88	250.98	40
TSP/PM	4.50	56.50	52.00	25
PM_{10}	2.40	67.80	65.40	15
$PM_{2.5}$	0.95	50.85	49.90	10
VOC	0.60	56.50	55.90	40
Lead	0.00033	0.09	0.09	0.6
H_2SO_4	2.24	58.39	56.15	7
CO_2e	46,117	438,825	392,708	75,000

*Baseline Actual Emissions are based on 2007 and 2008 emissions as they represent the most recent two years of actual operation prior to the modification of the boilers authorized by Permit No. 05543T21.

As shown in the Table 1.1 above, the emissions increases of CO, NOx, SO2, TSP, PM_{10}, $PM_{2.5}$, VOC, H_2SO_4, and CO_2e are greater than their respective thresholds and are therefore subject to PSD review. Therefore, this application includes Best Available Control Technology (BACT) analysis for these pollutants (Appendix E). An impact analysis (dispersion modeling) for all of these pollutants except VOC, H_2SO_4, and CO_2e pollutants will be submitted under separate cover. The PSD rules do not require modeling of VOC, H_2SO_4, and CO_2e emissions as there are no National Ambient Air Quality Standards (NAAQS) for these pollutants.

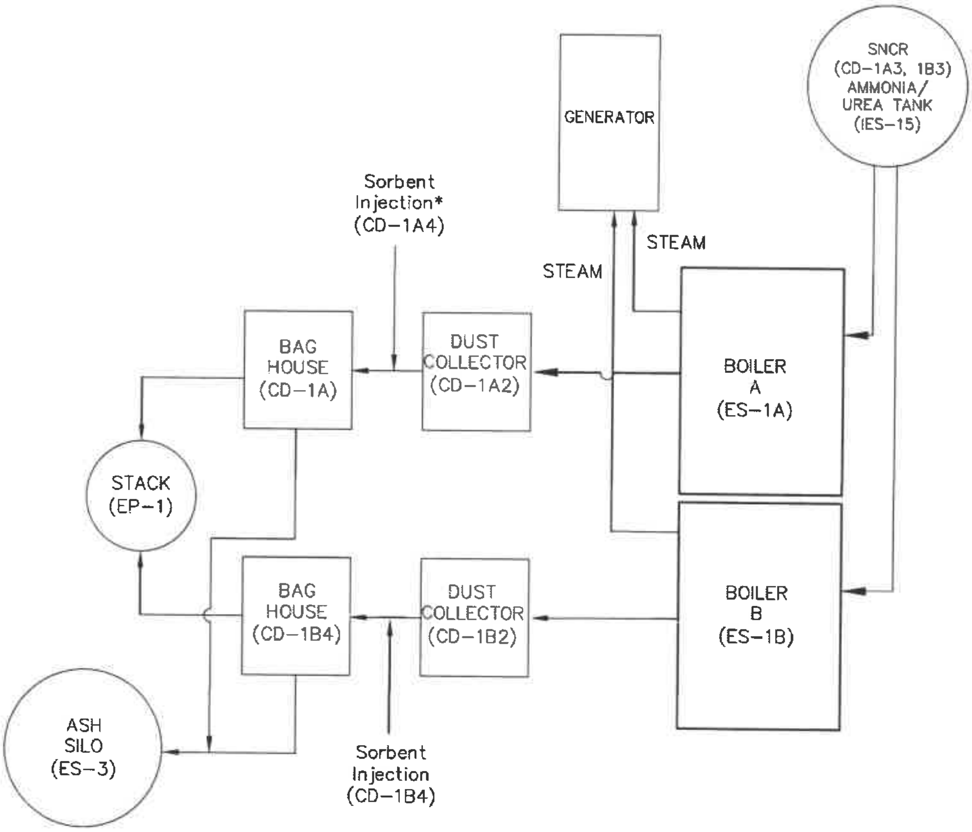
1.2 Application Contacts

The contact persons for additional information regarding this submittal are Mr. Steven R. Ingle, P.E., of NCRP and Mr. Frank Burbach of EPS who is the air quality permitting consultant for this project. Mr. Ingle may be reached at (205) 545-8759, and Mr. Burbach may be reached at (678) 336-8531.

2 PROCESS DESCRIPTION

NCRP will operate the existing two stoker boilers (Source ID Nos. ES-1A, ES-1B) fueled with wood biomass and poultry litter as cogeneration units. Most the steam produced by the boilers will be fed to the existing turbine to generate electricity which will be sold to the local utility. A small portion of the steam may be sent to a third party, Alamac American Knits facility. A simplified process flow diagram is provided as Figure 2.1 below. Detailed process description is provided in Section 2.2.

Figure 2.1 Process Flow Diagram



2.1 Proposed Changes to the Facility

As mentioned previously, the proposed changes in this PSD application were previously authorized in Permit No. 05543T21. These changes include the removal of coal, TDF, and other materials from the fuel mix and the addition of poultry litter as an alternate fuel. Three biomass belt dryers (Source ID Nos. ES-17, ES-18, and ES-19) were also added to the Facility in Permit

No. 05543T21. This application requests a PSD review of the modifications authorized by Permit No. 05543T21. No further modifications are requested as part of this application.

2.2 Process Equipment and Operations

All process equipment and operations described in this section are already permitted in the existing Title V permit and were existing at the facility prior to the introduction of poultry litter as a fuel.

2.2.1 Stoker Boilers (Source ID Nos. ES-1A and ES-1B)

The primary emission sources at the facility are two stoker boilers rated at 215 million British thermal units per hour (MMbtu/hr) each. The two boilers are identical and are fueled with non-CISWI wood and poultry litter. A small amount of fuel oil (approximately 10 gal/yr) is used for startup. The boilers are equipped with the following air pollution control equipment: selective non-catalytic reduction (SNCR) for NOx control, multiclones and baghouses for filterable $PM/PM_{10}/PM_{2.5}$, and good combustion practices for minimizing CO and organic emissions. Additionally, sorbent injection (trona or sodium bicarbonate) will be used to control SO_2 and acid gas emissions.

2.2.2 Fly Ash Silo (Source ID Nos. ES-3)

Fly ash is removed from the boilers' baghouses and stored in a silo (Source ID No. ES-3). Particulate emissions from the silo will be controlled by a bin vent filter atop the silo. The fly ash is tested for metals content on a prescribed basis and managed in accordance with all applicable regulations. Based on market demand and other factors, the fly ash may have a beneficial reuse in applications such as fertilizer, concrete aggregate or as a soil amendment.

2.2.3 Raw Material Receiving, Handling, and Storage (Source ID Nos. IES-8, IES-9, IES-10, and IES-11)

2.2.3.1 Wood Fuel

The wood biomass chips are delivered onsite by the supplier via trucks (Source ID Nos. IES-8 and IES-9). Facility personnel conduct an initial inspection of the wood chips to look for significant signs of contamination (e.g., visible presence of debris including large amount of plastic or metal). Wood chip shipments that do not meet the facility's quality control standards are rejected and returned to the supplier. Wood chips that pass the initial quality inspection are transferred into a hopper to a receiving bin. From the receiving bin, the wood chips are conveyed to an outdoor storage pile (Source ID No. IES-10). Emissions from the biomass handling operations are considered fugitive and will not be impacted by this project.

The wood storage piles (Source ID No. IES-10) are fenced and equipped with water cannons for fire protection. Wood chips will be conveyed to the biomass belt dryers (Source ID Nos. ES-17, ES-18, ES-19) as needed. Wind erosion emissions from the storage pile are considered fugitive and below insignificant thresholds (*i.e.*, less than 5 tons per year of all criteria pollutant and HAP less than 1,000 lb/yr).

2.2.3.2 Poultry Litter

Poultry litter is delivered onsite by the supplier via trucks. Similar to wood biomass, poultry litter shipments that do not meet the facility's quality control standards are rejected and returned to the supplier. Quality control standards for poultry litter may include visual inspection, moisture, heat content, and contaminant level testing. Poultry litter that passes the quality inspection is transferred into a hopper and a receiving bin via a magnetic separation system to remove ferrous metal constituents. From the receiving bin, the poultry litter is conveyed to a warehouse (New Unit, Source ID No. IES-16) for storage. The poultry litter is blended as needed to achieve the proper moisture and heat content for efficient combustion. Emissions from the poultry litter handling operations and storage are considered fugitive and below insignificant thresholds (*i.e.*, less than 5 tons per year of all criteria pollutant and HAP less than 1,000 lb/yr).

2.2.4 Sorbent Storage Silo (Source ID No. IES-13)

Sorbent material (trona or sodium bicarbonate) will be injected in the flue gas exhaust upstream of the baghouse to control SO_2 and acid gas emissions. The sorbent will be stored in a silo (Source ID No. IES-13). If additional milling of the sorbent is required prior to injection, NCRP will use a completely enclosed milling system with negligible emissions.

2.2.5 Biomass Belt Dryers (New Units, Source ID Nos. IES-17, IES-18, IES-19)

The facility proposes to installed three new belt dryers which will be used to reduce the moisture content of wood chips from 50% to 7%. To date, these three belt dryers have not been operated. The belt dryers are approximately 4,000 square feet total with a maximum capacity of 6 tons per hour (per dryer). Hot water from the condenser will be the sole heat source to the dryers when the sources begin operations. The dryers will operate at a maximum temperature of 122 °F. Due to the low operating temperature of the dryers, NCRP anticipates that emissions from the dryers will be below insignificant thresholds (*i.e.*, less than 5 tons per year of all criteria pollutant and HAP less than 1,000 lb/yr). The facility proposes to conduct a stack test for VOC emissions from one of the belt dryers within 180 days after startup. Dried chips will be stored outside prior to shipment offsite as product.

2.2.6 Other Ancillary Equipment

Other ancillary equipment at the Facility include the following:

- Diesel Fired Emergency Fire Pump - 340 hp (Source ID No. ES-1)
- Diesel Storage Tank – 500 gallons (Source ID No. IES-2)
- Fire Pump Fuel Oil Storage Tank – 250 gallons (Source ID No. IES-3)
- Solvent Parts Cleaner – 20 gallons (Source ID No. IES-4)
- Turbine Lube Oil Tank Vent – 950 gallons (Source ID No. IES-5)
- Cooling Towers – 19,190 gallons per minute (Source ID No. IES-6)
- Aqueous Ammonia Tank - 10,000 gallons (Source ID No. ES-15)

3 Emission Calculations Methodology

For the purposes of this application, the pollutants of concern were restricted to regulated pollutants under the Clean Air Act. These pollutants include NO_x, SO_2, PM, CO, volatile organic compounds (VOC), sulfuric acid, hazardous air pollutants (HAP), and selected North Carolina toxic air pollutants (TAP).

3.1 Boiler Emission Factors

Emissions from the boiler are estimated using the following methodology:

3.1.1 Wood Combustion Emission Factors

Emission factors for wood biomass combustion in the boilers are selected from the following sources, in order of hierarchy:

- Boiler and air pollution control device (APCD) vendor guarantees. As shown in Appendix B, vendor guarantees are available for NO_x, SO_2, PM, CO, HCl, VOC, and ammonia (NH_3).
- EPA AP-42 Section 1.6 – Wood Residue Combustion in Boilers (9/03) for hazardous air pollutants (HAPs) and toxic air pollutants (TAPs).
- May 2010 Emission test data for Coastal Carolina Clean Power, LLC's Kenansville, NC Facility (CCCP Kenansville) for chlorine, manganese, formaldehyde, acetaldehyde, acrolein, styrene, benzene, and toluene. CCCP Kenansville is a sister-site of the Lumberton facility with identical boilers.

3.1.2 Poultry Litter Combustion Emission Factors

Emission factors for poultry litter combustion in the boilers are estimated from the following sources:

- CCCP Kenansville Poultry Litter Test Burn data conducted in July 2014.
- CCCP Kenansville Poultry Litter Test Burn data conducted in May and July 2013.

The emission factor sources referenced above are included in Appendix B.

3.1.3 Fuel Oil Combustion Emission Factors

A small amount of fuel oil (up to 10 gallons per year) is used during boiler startups. Emission factors for fuel oil combustion during startups are based on EPA AP-42 Section 1.3 – Fuel Oil Combustion (5/10).

4 REGULATORY REVIEW

This section discusses regulations that are potentially applicable to the proposed project.

4.1 Prevention of Significant Deterioration of Air Quality Review [15A NCAC 2D .0530]

As mentioned in the Introduction Section (Section 1), the facility was an existing PSD major source prior to the issuance of Permit No. 05543T21 in 2015, which added poultry litter and removed coal, TDF, and other materials from the fuel mix and applied facility-wide 250-tpy emissions limitations. For the purpose of this application, NCRP is evaluating PSD applicability of the modification authorized by Permit No. 05543T21 based on the assumption that the facility is an existing PSD major source. Therefore, any PSD pollutants for which the increase in emissions resulting from the modification are greater than the significant emission rates (SERs) for major sources are subject to PSD review. Because the boilers had not operated since 2009, the baseline actual emissions were determined based on the 2007 and 2008 emissions inventories. The projected actual emissions were calculated as described in the Emissions Calculation Methodology Section (Section 3). The differences between these values were then determined to represent the emissions increases for PSD applicability purposes. The PSD SERs were exceeded for the following pollutants: CO, NO_X, SO_2, TSP, PM_{10}, and $PM_{2.5}$, VOC, H_2SO_4, and CO_2e. Therefore, a BACT analysis was performed for these pollutants (Appendix E). Additionally, an impact analysis is being performed for CO, NO_X, SO_2, TSP, PM_{10}, and $PM_{2.5}$, as these pollutants have National Ambient Air Quality Standards (NAAQS). The modeling report will be submitted to the agency under separate cover.

4.2 New Source Performance Standards [15A NCAC 2D 0524]

4.2.1 NSPS for Industrial - Commercial - Institutional Steam Generating Units [40 CFR Part 60 Subpart Db]

NSPS Subpart Db applies to boilers with a heat input capacity of greater than 100 MMBtu/hr which are constructed, modified, or reconstructed after June 19, 1984. Because the boilers only burn very low sulfur oil (during startup) and wood biomass with a potential SO_2 emission rate of 0.32 lb/MMBtu heat input or less, no SO_2 limit of the NSPS will apply [40 CFR 60.42b(k)(2)].

The permit limits the fuel oil usage during startup to less than 10% of the annual capacity. Therefore, the NSPS NO_x limit does not apply to the boilers [40 CFR 60.44b(c)].

Since the boilers were constructed, reconstructed, or modified after February 28, 2005, the boilers are subject to a PM emission limit of 0.03 lb/MMBtu [40 CFR 60.43b(h)(1)]. Also, because the boilers combust wood, they are subject to a limit of 20% opacity (6-minute average), except for one 6-minute period per hour of no more than 27% opacity [40 CFR 60.43b(f)].

NCRP conducted an initial NSPS performance test for PM while burning poultry litter on December 22, 2016. The test results indicated compliance.

4.2.2 NSPS for Commercial and Industrial Solid Waste Incineration Units [40 CFR Part 60 Subpart CCCC]

The NSPS for Commercial and Industrial Solid Waste Incineration Units (40 CFR 60 Subpart CCCC) does not apply to this facility because the boilers are not classified as Industrial Solid Waste Incineration units and will not burn solid waste as defined under 40 CFR 241. Note that poultry litter to be burned at the facility will be acquired and supplied by Poultry Power USA (PPUSA) who received a determination letter from NCDAQ on March 8, 2013 (Applicability Determination No. 2131) stating that the poultry litter as described in the letter meets the legitimacy criteria under 40 CFR 241.3(d)(1) and is a non-solid waste fuel in accordance with 40 CFR 241.3(b)(4). A copy of the Applicability Determination letter is included in Appendix C.

4.2.3 NSPS for Large Municipal Waste Combustors for Which Construction is Commenced After September 20, 1994 or for Which Modification or Reconstruction is Commenced After June 19, 1996 [40 CFR Part 60 Subpart Eb]

This NSPS does not apply to the facility because the boilers are not classified as municipal waste combustor units.

4.2.4 NSPS for Stationary Compression Ignition Internal Combustion Engines [40 CFR Part 60 Subpart IIII]

The NSPS for Stationary Compression Ignition (CI) Internal Combustion Engines (ICE) (40 CFR Part 60 Subpart IIII) applies to owners and operators of CI ICE that are manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006. This rule is applicable to the existing 340 hp emergency fire pump (Source ID No. ES-1) at the facility.

The emergency fire pump (Source ID No. ES-1) is a certified engine which meets the applicable emissions limits specified in 40 CFR 60.4211(c). A non-resettable hour meter is installed, and non-emergency operation for maintenance and readiness testing of the fire pump will be limited to 100 hours per year (per 60.4209(a) and 60.4211(e)).

4.3 National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Parts 63; 15A NCAC 2D .1110 and .1111]

4.3.1 NESHAP for Area Sources: Industrial, Commmercial, and Institutional Boilers [40 CFR Part 63 Subpart JJJJJJ]

NCRP is subject to the NESHAP Subpart JJJJJJ. Since the facility was constructed before June 4, 2010, the boilers (Source ID Nos. ES-1A, ES-1B) are considered to be existing sources under the NESHAP. The applicable requirements from the NESHAP are summarized below:

- Compliance Date: Within 30 days of re-start (40 CFR 63.11210(j)).
- Startup/Shutdown Work Practice Standard: Minimize startup and shutdown periods following the manufacturer's recommended procedures. If manufacturer's recommended procedures are not available, follow recommended procedures for a unit of similar design for which manufacturer's recommended procedures are available (40 CFR 63.11201, Table 2 of Subpart JJJJJJ).
- Tune-Up Work Practice Standard: Conduct an initial and biennial tune-up of the boiler (40 CFR 63.11201, Table 2 of Subpart JJJJJJ) following the tune-up procedures under 40 CFR 63.11223. Each tune-up must occur within 25 months of the previous tune-up.
- One-Time Energy Assessment Work Practice Standard: Conduct a one-time energy assessment (40 CFR 63.11201, Table 2 of Subpart JJJJJJ) following the definition in 40 CFR 63.11237 and the procedures in Table 2 of Subpart JJJJJJ.
- General Requirements: Operate and maintain the boilers, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require you to make any further efforts to reduce emissions if levels required by this standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source (40 CFR 63.11205(a)).
- Initial Work Practice Compliance Demonstration: The initial biennial tune-up must be conducted and reported in the Notification of Compliance Status report. Therefore, it must be conducted within 30 days of re-start. The startup and shutdown work practices must also be reported in the Notification of Compliance Status report (40 CFR 63.11214(b) and (d)).
- Initial Notification: Due within 120 days of startup (40 CFR 63.11225(a)(2)).

- Notification of Compliance Status: Due within 60 days after completing the initial tune-up and energy assessment, including the applicable certifications from 40 CFR 63.11225(a)(4).
- Biennual Compliance Certification Report: Must be prepared by March 1 of each year following the year in which a biennial tune-up is conducted. If any deviations from applicable requirements occurred, the report must be submitted by March 15. The content of the report is specified in 40 CFR 63.11225(b)(1) through (4).
- Recordkeeping Requirements: Records of tune-ups must be maintained as specified in 40 CFR 63.11225.
- Definitions: The following specific definitions apply:

  Biomass means any biomass-based solid fuel that is not a solid waste. This includes, but is not limited to, wood residue and wood products (e.g., trees, tree stumps, tree limbs, bark, lumber, sawdust, sander dust, 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 is not intended to suggest that these materials are or are not solid waste.

  Biomass subcategory includes any boiler that burns at least 15 percent biomass on an annual heat input basis.

4.3.2 NESHAP for Reciprocating Internal Combustion Engine (RICE) [40 CFR Part 63 Subpart ZZZZ]

The RICE NESHAP applies to the emergency fire pump (Source ID No. ES-1); however, the only applicable requirement is to meet any applicable provisions of NSPS IIII (40 CFR 63.6590(c)). No further requirements, including the initial notification and other NESHAP provisions, apply to the fire pump engine under this rule. See section 4.2.4 for discussion on the NSPS IIII requirements.

4.4 Acid Rain Program [15A NCAC 2Q .0400]

The boilers are currently subject to the Acid Rain Program. Even though the boilers will no longer burn fossil fuel (coal), since coal was used as fuel in the past, the boilers will still be considered "fossil fuel fired" in accordance with 40 CFR 72.2:

> Fossil fuel-fired *means the combustion of fossil fuel or any derivative of fossil fuel, alone or in combination with any other fuel, independent of the percentage of fossil fuel consumed in any calendar year (expressed in MMBtu).*

This is consistent with EPA letter[1] to CMS Generation Craven County Wood Energy dated October 23, 2009 which summarily states:

> *In summary, a unit, such as Craven County Unit ES5A, that is combusting fossil fuel and meets the other requirements for being an affected unit and thus subject to the Acid Rain Program requirements would not become an unaffected unit and no longer subject to these requirements simply by switching entirely to non-fossil fuel.*

The current permit contains applicable Acid Rain Program requirements including SO_2 allowance allocations and NOx requirements. No changes to the Acid Rain Program permit requirements are required.

4.5 Cross-State Air Pollution Rule (CSAPR)

On July 6, 2011, the EPA finalized the Cross-State Air Pollution Rule (CSAPR) to replace CAIR. However, on December 30, 2011, CSAPR was stayed prior to implementation. On October 23, 2014, the U.S. Court of Appeals for the District of Columbia Circuit granted the EPA's motion to lift the stay of CSAPR. Through subsequent EPA rulings, CSAPR took effect on January 1, 2015.

NCRP will comply with all applicable CSAPR requirements and emissions allowance from 2015 forward.

4.6 State Rules

4.6.1 Particulates from Wood Burning Indirect Heat Exchangers [15A NCAC 2D .0504]

This standard applies to the boilers because they burn wood. The allowable PM emission limit is determined as follows:

$$E = 1.1698 * Q^{(-0.2230)}$$

Where:

E = allowable emission limit for PM (in lb/MMBtu)
Q = maximum heat input (in MMBtu/hr)

[1] See http://www.epa.gov/airmarkets/progsregs/arp/docs/craven_county.pdf

Based on the 215 MMBtu/hr maximum heat input (per boiler), the allowable emission limit for PM while burning wood biomass is 0.35 lb/MMBtu. Operation of the COMS will be used to demonstrate compliance with this standard. Note that NSPS 40 CFR 60 Subpart Db includes a more stringent PM limit of 0.03 lb/MMBtu. Therefore, the 15A NCAC 2D .0504 PM limit is superseded by the NSPS.

4.6.2 Sulfur Dioxide Emissions from Combustion Sources [15A NCAC 2D .0516]

This standard limits SO_2 emissions from the boilers to 2.3 lbs/MMBtu heat input. Compliance with this standard will be demonstrated by firing biomass (low sulfur) and ultra-low sulfur fuel oil during startup. The current permit includes the applicable limits and requirements to demonstrate compliance with this standard. No change is expected to be required for section 15A NCAC 2D .0516 of the current permit.

4.6.3 Control of Visible Emissions [15A NCAC 2D .0521]

This standard requires that visible emissions from the boilers shall not be more than 20% opacity when averaged over a six-minute period. However, six-minute averaging periods may exceed 20% not more than once in any hour and not more than four times in any 24-hour period. The current permit includes the applicable limits and requirements to demonstrate compliance with this standard. No change is expected to be required for section 15A NCAC 2D .0521 of the current permit.

4.6.4 Control of Odorous Emissions [15A NCAC 2D .1806]

This standard requires that the facility shall not be operated without implementing management practices or installing and operating odor control equipment sufficient to prevent odorous emissions from the facility from causing or contributing to odors beyond the facility's boundary. As mentioned in Section 2.2.3, the poultry litter will be stored in a warehouse (Source ID No. IES-16) which will be completely enclosed under negative pressure and vented to the boilers to minimize odor.

4.6.5 Particulates from Miscellaneous Industrial Processes [15A NCAC 2D .0515]

This standard regulates PM emissions for industrial process for which no other emission control standard applies. Those processes include fuel handling, fly and bottom ash handling, and the cooling tower. The current permit includes the applicable limits and requirements to demonstrate compliance with this standard. No change is expected to be required for section 15A NCAC 2D .0515 of the current permit.

4.6.6 Toxic Air Pollutant Procedures and Standards [15A NCAC 2Q .0700, 15A NCAC 2D .1100]

This standard requires facilities that emit a toxic air pollutant (TAP) greater than its respective Toxic Air Pollutant Emission Rates (TPERs) to obtain a permit. The current permit includes the applicable limits and requirements to demonstrate compliance with this standard. In accordance with North Carolina recent legislation, the standard does not apply to sources for which a MACT or GACT standard pursuant to 40 CFR Parts 61 or 63 applies. Since the boilers (Source ID Nos. ES-1A, ES-1B) and emergency fire pump (Source ID No. ES-1) are regulated under 40 CFR Part 63, the TAP standard does not apply. Please note that since no MACT or GACT standard applies to the aqueous ammonia storage tank (Source ID No. ES-15), the TAP standard still applies to this emission unit. NCRP plans to supplement this application with a modeling demonstration showing ambient impacts of TAPs that may be emitted in excess of the associated TPERs.

4.7 Other Rules

4.7.1 Prevention of Accidental Releases [40 CFR 68, CAA Section 112(r)]

The aqueous ammonia has a maximum ammonia concentration of 19%. Under 40 CFR 68, the Risk Management Plan (RMP) threshold for aqueous ammonia is 20%. Therefore, an RMP is not required.

4.7.2 Non-Hazardous Secondary Materials (NHSM) [40 CFR 241]

The boilers are not classified as Industrial Solid Waste Incineration units and will not burn solid waste as defined under 40 CFR 241 as discussed below.

4.7.2.1 Wood Biomass

Wood biomass to be burned at the facility includes non-Commercial/Industrial Solid Waste Incineration (CISWI) wood. In the final amendments to the Non-Hazardous Secondary Materials rule (NHSM rule) [40 CFR 241] promulgated on February 7, 2013, "clean cellulosic biomass" is defined as follows:

> *Clean cellulosic biomass* means those residuals that are akin to traditional cellulosic biomass, including, but not limited to: Agricultural and forest-derived biomass (e.g., green wood, forest thinnings, clean and unadulterated bark, sawdust, trim, tree harvesting residuals from logging and sawmill materials, hogged fuel, wood pellets, untreated wood pallets); urban wood (e.g., tree trimmings, stumps, and related forest-derived biomass from urban settings); corn stover and other biomass crops used specifically for the production of cellulosic biofuels (e.g., energy cane, other fast growing grasses,

byproducts of ethanol natural fermentation processes); bagasse and other crop residues (e.g., peanut shells, vines, orchard trees, hulls, seeds, spent grains, cotton byproducts, corn and peanut production residues, rice milling and grain elevator operation residues); wood collected from forest fire clearance activities, trees and clean wood found in disaster debris, clean biomass from land clearing operations, and clean construction and demolition wood. These fuels are not secondary materials or solid wastes unless discarded. Clean biomass is biomass that does not contain contaminants at concentrations not normally associated with virgin biomass materials.

The wood biomass to be used at the facility meets the definition of clean cellulosic biomass provided above. Therefore, it is considered a fuel and not solid waste.

4.7.2.2 Poultry Litter

Poultry litter burned at the facility is acquired and supplied by Poultry Power USA (PPUSA) who received a determination letter from NCDAQ on March 8, 2013 (Applicability Determination No. 2131) stating that the poultry litter as described in the letter meets the legitimacy criteria under 40 CFR 241.3(d)(1) and is a non-solid waste fuel in accordance with 40 CFR 241.3(b)(4). A copy of the Applicability Determination letter is included in Appendix C.

4.7.3 Local Zoning Consistency Determination

Robeson County and the City of Lumberton have been identified as having jurisdiction over the land on which the facility is located. Zoning consistency determination requests were submitted to Robeson County and the City of Lumberton in accordance with the requirements of N.C.G.S. §143-215.108(f) and 15 NCAC 02Q .0507(d)(1) when the permit application for Permit No. 05543T21 was submitted. No additional equipment and no expansion of existing operations is being requested in this PSD application. The zoning consistency determinations received from Robeson County and the City of Lumberton are included in Appendix D.

5 Testing and Monitoring

To demonstrate compliance with the proposed emissions limits and applicable regulations, the following testing and monitoring are proposed.

5.1 Testing

Table 5.1 provides a summary of the proposed testing.

Table 5.1 Proposed Testing

Pollutant	Test Type	Requirement / Regulation
NO_x	CEMS	BACT Limit Compliance
SO_2	CEMS	BACT Limit Compliance
CO	CEMS	BACT Limit Compliance
VOC	Stack Test	BACT Limit Compliance
$PM/PM_{10}/PM_{2.5}$	Stack Test	NSPS BACT Limit Compliance
HCl	Stack Test	HAP synthetic minor source confirmation
Sulfuric Acid Mist	Stack Test	BACT Limit Compliance

5.2 Monitoring

Table 5.2 provides a summary of the proposed monitoring.

Table 5.2 Proposed Monitoring

Pollutant	Parameter	Frequency	Averaging Period	Requirement / Regulation
Boiler				
NO_x	Emissions	Continuous (CEMS)	30-Day Rolling	BACT Limit Compliance
SO_2	Emissions	Continuous (CEMS)	30-Day Rolling	BACT Limit Compliance
CO	Emissions	Continuous (CEMS)	30-Day Rolling	BACT Limit Compliance
$PM/PM_{10}/PM_{2.5}$	Opacity	Continuous (COMS)	6-Minute	NSPS
CO_2e	Emissions	Monthly	12-month Rolling	BACT
Site-Wide				
HCl	Emissions	Calculated on a Monthly Basis	12-Month	HAP Synthetic Minor Limit

APPENDIX A

Application Forms

Received
MAR 29 2017
Air Permits Section

FORM AA

ADMINISTRATIVE APPLICATION (GENERAL INFORMATION)

NOTE- APPLICATION WILL NOT BE PROCESSED WITHOUT THE FOLLOWING:

- ☑ Local Zoning Consistency Determination (new or modification only)
- ☑ Appropriate Number of Copies of Application
- ☑ Application Fee (if required)
- ☑ Responsible Official/Authorized Contact Signature
- ☑ P.E. Seal (if required)

GENERAL INFORMATION

Legal Corporate/Owner Name: North Carolina Renewable Power - Lumberton, LLC	
Site Name: North Carolina Renewable Power - Lumberton, LLC	
Site Address (911 Address) Line 1: 1866 Hestertown Road	
Site Address Line 2:	
City: Lumberton	State: North Carolina
Zip Code: 28359	County: Robeson

CONTACT INFORMATION

Responsible Official/Authorized Contact:	***Invoice Contact:*** Steven R. Ingle
Name/Title: Steven R. Ingle, Vice President - Engineering	Name/Title: Steven R. Ingle, Vice President - Engineering
Mailing Address Line 1: 2100 Southbridge Parkway, Suite 540	Mailing Address Line 1: 2100 Southbridge Parkway, Suite 540
Mailing Address Line 2:	Mailing Address Line 2:
City: Birmingham State: AL Zip Code: 35209	City: Birmingham State: AL Zip Code: 35209
Primary Phone No.: (205) 545-8759 Fax No.:	Primary Phone No.: (205) 545-8759 Fax No.:
Secondary Phone No.:	Secondary Phone No.:
Email Address: single@greenfuelsenergy.com	Email Address: single@greenfuelsenergy.com
Facility/Inspection Contact:	***Permit/Technical Contact:***
Name/Title: Steven R. Ingle, Vice President - Engineering	Name/Title: Steven R. Ingle, Vice President - Engineering
Mailing Address Line 1: 2100 Southbridge Parkway, Suite 540	Mailing Address Line 1: 2100 Southbridge Parkway, Suite 540
Mailing Address Line 2:	Mailing Address Line 2:
City: Birmingham State: AL Zip Code: 35209	City: Birmingham State: AL Zip Code: 35209
ary Phone No.: (205) 545-8759 Fax No.:	Primary Phone No.: (205) 545-8759 Fax No.:
econdary Phone No.:	Secondary Phone No.:
Email Address: single@greenfuelsenergy.com	Email Address: single@greenfuelsenergy.com

APPLICATION IS BEING MADE FOR

☐ New Non-permitted Facility/Greenfield ☑ Modification of Facility (permitted) ☐ Renewal Title V ☐ Renewal Non-Title V
☐ Name Change ☐ Ownership Change ☐ Administrative Amendment ☐ Renewal with Modification

FACILITY CLASSIFICATION AFTER APPLICATION (Check Only One)

☐ General ☐ Small ☐ Prohibitory Small ☐ Synthetic Minor ☑ Title V

FACILITY (Plant Site) INFORMATION

Describe nature of (plant site) operation(s):

24 MW biomass-fired power generation facility utilizing clean cellulosic biomass (non-CISWI) wood and poultry litter for fuel.

	Facility ID No. 7800166
Primary SIC/NAICS Code: 4911 / 221117	Current/Previous Air Permit No. 05543T23 Expiration Date: 9/30/2017
Facility Coordinates: Latitude: 34.594922	Longitude: -78.9946
Does this application contain confidential data? ☐ **YES** ☑ **NO**	*****If yes, please contact the DAQ Regional Office prior to submitting this application.*** (See Instructions)**

PERSON OR FIRM THAT PREPARED APPLICATION

Person Name: Frank Burbach	Firm Name: Environmental Planning Specialists, Inc.
Mailing Address Line 1: 1050 Crown Pointe Parkway	Mailing Address Line 2: Suite 550
City: Atlanta State: GA	Zip Code: 30338 County: Dekalb
Phone No.: (678) 336-8531 Fax No.: (404) 315-8509	Email Address: fburbach@envplanning.com

SIGNATURE OF RESPONSIBLE OFFICIAL/AUTHORIZED CONTACT

Name (typed): Steven R. Ingle	Title: Vice President - Engineering
X Signature(Blue Ink):	Date: 3-24-17

Attach Additional Sheets As Necessary

FORM AA (continued, page 2 of 2)
ADMINISTRATIVE APPLICATION

SECTION AA1 - APPLICATION FOR NON-TITLE V PERMIT RENEWAL

________________ (Company Name) hereby formally requests renewal of Air Permit No. ________________

There have been no modifications to the originally permitted facility or the operations therein that would require an air permit since the last permit was issued.

Is your facility subject to 40 CFR Part 68 "Prevnetion of Accidental Releases" - Section 112(r) of the Clean Air Act? ☐ YES ☐ NO

If yes, have you already submitted a Risk Manage Plan (RMP) to EPA? ☐ YES ☐ NO Date Submitted: ________________

Did you attach a current emissions inventory? ☐ YES ☐ NO

If no, did you submit the inventory via AERO or by mail? ☐ Via AERO ☐ Mailed Date Mailed: ________________

SECTION AA2- APPLICATION FOR TITLE V PERMIT RENEWAL

In accordance with the provisions of Title 15A 2Q .0513, the responsible official of ________________ (Company Name)
hereby formally requests renewal of Air Permit No. ________________ (Air Permit No.) and further certifies that:

(1) The current air quality permit identifies and describes all emissions units at the above subject facility, except where such units are exempted under the North Carolina Title V regulations at 15A NCAC 2Q .0500;

(2) The current air quality permit cits all applicable requirements and provides the method or methods for determing compliance with the applicable requirements;

(3) The facility is currently in compliance, and shall continue to comply, with all applicable requiremetns. (Note: As provided under 15A NCAC 2Q .0512 compliance with the conditions of the permit shall be deemed compliance with the applicable requirements specifically identified in the permit);

(4) For applicable requirements that become effective during the term of the renewed permit that the facility shall comply on a timely basis;

(5) The facility shall fulfill applicable enhanced monitoring requirements and submit a compliance certification as required by 40 CFR Part 64.

The responsible official (signature on page 1) certifies under the penalty of law that all information and statements provided above, based on information and belief formed after reasonable inquiry, are true, accurate, and complete.

SECTION AA3- APPLICATION FOR NAME CHANGE

New Facility Name: ________________

Former Facility Name: ________________

An official facility name change is requested as described above for the air permit mentioned on page 1 of this form. Complete the other sections if there have been modifications to the originally premitted facility that would requie an air quality permit since the last permit was issued and if ther has been an ownership change associated with this name change.

SECTION AA4- APPLICATION FOR AN OWNERSHIP CHANGE

By this application we hereby request transfer of Air Quality Permit No. ________________ from the former owner to the new owner as described below.
The transfer of permit responsibility, coverage and liability shall be effective ________________ (immediately or insert date.) The legal ownership of the facility described on page 1 of this form has been or will be transferred on ________________ (date). There have been no modifications to the originally permitted facility that would require an air quality permit since the last permit was issued.

Signature of New (Buyer) Responsible Official/Authorized Contact (as typed on page 1):

X Signature (Blue Ink): ________________

Date:

New Facility Name:

Former Facility Name:

Signature of Former (Seller) Responsible Official/Authorized Contact:

Name (typed or print):

Title:

X Signature (Blue Ink): ________________

Date:

Former Legal Corporate/Owner Name:

In lieu of the seller's signature on this form, a letter may be submitted with the seller's signature indicating the ownership change

SECTION AA5- APPLICATION FOR ADMINISTRATIVE AMENDMENT

Describe the requested administrative amendment here (attach additional documents as necessary):

Attach Additional Sheets As Necessary

FORMs A2, A3

EMISSION SOURCE LISTING FOR THIS APPLICATION - A2

112r APPLICABILITY INFORMATION - A3

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

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

EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	CONTROL DEVICE ID NO.	CONTROL DEVICE DESCRIPTION
Equipment To Be ADDED By This Application (New, Previously Unpermitted, or Replacement)			
	N/A		
Existing Permitted Equipment To Be MODIFIED By This Application			
ES-1A	Boiler 1A	CD-1A, 1A2, 1A3, 1A4	Bagfilter, Multicyclone, SNCR, Sorbent Injection
ES-1B	Boiler 1B	CD-1B, 1B2, 1B3, 1B4	Bagfilter, Multicyclone, SNCR, Sorbent Injection
Equipment To Be DELETED By This Application			
	N/A		

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

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

If No, please specify in detail how your facility avoided applicability: Facility does not store chemicals at levels exceeding the applicable 112(r) thresholds.

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

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

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

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

☐ Yes ☐ No If yes, please specify: ____________________

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

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

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

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

EMISSION SOURCE DESCRIPTION: Boilers 1A and 1B are identical stoker boilers with max heat input capacity of 215 MMBtu/hr each.	EMISSION SOURCE ID NO: ES-1A, ES-1B CONTROL DEVICE ID NO(S): CD-1A, CD-1A2, CD-1A3, CD-1A4 CD-1B, CD-1B2, CD-1B3, CD-1B4
OPERATING SCENARIO 1 OF 1	EMISSION POINT (STACK) ID NO(S): EP-1 (shared stack)

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):
Boilers 1A and 1B are existing boilers burning non-CISWI wood and poultry litter. The fuel mix is predicted to be up to 85% poultry litter and 15% wood, by weight. See Attachment A for Process Flow Diagram.

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

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

START CONSTRUCTION DATE: 10/16/2015 (first firing of poultry litter) DATE MANUFACTURED: 1983

MANUFACTURER / MODEL NO.: Foster Wheeler EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR

IS THIS SOURCE SUBJECT TO? [x] NSPS (SUBPARTS?): Db [x] NESHAP (SUBPARTS?): JJJJJJ

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

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

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

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

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

See Appendix B - Emission Calculations

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

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

See Appendix B - Emission Calculations

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

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

Attach Additional Sheets As Necessary

FORM B1

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

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

EMISSION SOURCE DESCRIPTION: Boilers 1A and 1B are identical stoker boilers with max heat input capacity of 215 MMBtu/hr each.	EMISSION SOURCE ID NO: ES-1A, ES-1B CONTROL DEVICE ID NO(S): CD-1A, CD-1A2, CD-1A3, CD-1A4 CD-1B, CD-1B2, CD-1B3, CD-1B4
OPERATING SCENARIO: 1 OF 1	EMISSION POINT (STACK) ID NO(S): EP-1 (shared stack)

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

HEATING MECHANISM: ☑ INDIRECT ☐ DIRECT

MAX. FIRING RATE (MMBTU/HOUR):

WOOD-FIRED BURNER

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

PERCENT MOISTURE OF FUEL: 19 - 50%

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

FUEL FEED METHOD: Screw Conveyor | HEAT TRANSFER MEDIA: ☑ STEAM ☐ AIR ☐ OTHER (DESCRIBE) ____

COAL-FIRED BURNER

TYPE OF BOILER | IF OTHER DESCRIBE:

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

OIL/GAS-FIRED BURNER

TYPE OF BOILER: ☐ UTILITY ☐ INDUSTRIAL ☐ COMMERCIAL ☐ INSTITUTIONAL
TYPE OF FIRING: ☐ NORMAL ☐ TANGENTIAL ☐ LOW NOX BURNERS ☐ NO LOW NOX BURNER

OTHER FUEL-FIRED BURNER

TYPE(S) OF FUEL: Wood/Poultry Litter PERCENT MOISTURE: 25 - 30%

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

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

FUEL USAGE (INCLUDE STARTUP/BACKUP FUELS)

FUEL TYPE	UNITS	MAXIMUM DESIGN CAPACITY (UNIT/HR)	REQUESTED CAPACITY LIMITATION (UNIT/HR)
Wood	ton/hr per boiler	23.0	
Wood/Poultry Litter Mix	ton/hr per boiler	23.0	
Fuel Oil (startup only)	gal/yr per boiler	N/A	2,690.6 Mgal/yr

FUEL CHARACTERISTICS (COMPLETE ALL THAT ARE APPLICABLE)

FUEL TYPE	SPECIFIC BTU CONTENT	SULFUR CONTENT (% BY WEIGHT)	ASH CONTENT (% BY WEIGHT)
Wood	4,730 Btu/lb	<0.1%	3.6
Wood/Poultry Litter Mix	4,719 Btu/lb	<1%	1.6
Fuel Oil (startup only)	140 MMBtu/Mgal	0.0015%	N/A

COMMENTS:

Attach Additional Sheets As Necessary

FORM C1
CONTROL DEVICE (FABRIC FILTER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** C1

CONTROL DEVICE ID NO: CD-1A, CD-1B	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-1A, ES-1B
EMISSION POINT (STACK) ID NO(S): EP-1	POSITION IN SERIES OF CONTROLS NO. 4 OF 4 UNITS
OPERATING SCENARIO:	
1 OF 1	P.E. SEAL REQUIRED (PER 2q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
The bagfilter (CD-1A, CD-1B) and multicylone (CD-1A2, CD-1B2) systems have a minimum control efficiency of 95% for particulate matter.
The mechanical multi-cyclone dust collector is upstream of the bagfilters to remove larger sized dust particles and char from the flue gas that would otherwise pose as a potential fire hazard to the bagfilters.

POLLUTANTS COLLECTED:	PM/PM10/PM2.5			
BEFORE CONTROL EMISSION RATE (LB/HR):	See Appendix B - Emission Calculations			
CAPTURE EFFICIENCY:	100 %	%	%	%
CONTROL DEVICE EFFICIENCY:	95 %	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	95 %	%	%	%
EFFICIENCY DETERMINATION CODE:	2			
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	See Appendix B - Emission Calculations			

PRESSURE DROP (IN H_2O): MIN: MAX: 10 GAUGE? ☑ YES ☐ NO		
BULK PARTICLE DENSITY (LB/FT^3):	INLET TEMPERATURE (°F): MIN 320 MAX 365	
POLLUTANT LOADING RATE: 259.2 ☑ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (°F) MIN 320 MAX 365	
INLET AIR FLOW RATE (ACFM): 91,000	FILTER OPERATING TEMP (°F): 375	
NO. OF COMPARTMENTS: 6	NO. OF BAGS PER COMPARTMENT: 126	LENGTH OF BAG (IN.): 79
NO. OF CARTRIDGES: NA	FILTER SURFACE AREA PER CARTRIDGE (FT^2):	DIAMETER OF BAG (IN.): 6
TOTAL FILTER SURFACE AREA (FT^2): 11.6	AIR TO CLOTH RATIO: 7,818	
DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE	FILTER MATERIAL: ☐ WOVEN ☑ FELTED	

DESCRIBE CLEANING PROCEDURES:

☑ AIR PULSE ☐ SONIC
☐ REVERSE FLOW ☐ SIMPLE BAG COLLAPSE
☐ MECHANICAL/SHAKER ☐ RING BAG COLLAPSE
☐ OTHER:

DESCRIBE INCOMING AIR STREAM:
Boiler flue gas

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:
Filters are inspected annually during plant shutdown.

Attach Additional Sheets As Necessary

FORM C4

CONTROL DEVICE (CYCLONE, MULTICYCLONE, OR OTHER MECHANICAL)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C4**

CONTROL DEVICE ID NO: CD-1A2, CD-1B2	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-1A, ES-1B
EMISSION POINT (STACK) ID NO(S): EP-1 (shared stack)	POSITION IN SERIES OF CONTROLS NO. 2 OF 4 UNITS
OPERATING SCENARIO: 1 OF 1	P.E. SEAL REQUIRED (PER 2Q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM :
The bagfilter (CD-1A, CD-1B) and multicylone (CD-1A2, CD-1B2) systems will have a minimum control efficiency of 95% for particulate matter.
The mechanical multi-cyclone dust collector will be installed upstream of the bagfilters to remove larger sized dust particles and char from the flue gas that would otherwise pose as a potential fire hazard to the bagfilters.

POLLUTANT(S) COLLECTED:	See Attachment B - Emissions Calculations			
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):				

PRESSURE DROP (IN. H_2O): 0.5 MIN 2.8 MAX	
INLET TEMPERATURE (°F): 320 MIN 365 MAX	OUTLET TEMPERATURE (°F): 320 MIN 365 MAX
INLET AIR FLOW RATE (ACFM): 91,000	BULK PARTICLE DENSITY (LB/FT^3):
POLLUTANT LOADING RATE (GR/FT^3): 16.5	

SETTLING CHAMBER	**CYCLONE**			**MULTICYCLONE**
LENGTH (INCHES):	INLET VELOCITY (FT/SEC):		☐ CIRCULAR ☐ RECTANGLE	NO. TUBES: 20
WIDTH (INCHES):	*DIMENSIONS (INCHES) See instructions*		*IF WET SPRAY UTILIZED*	DIAMETER OF TUBES: 24"
HEIGHT (INCHES):	H:	Dd:	LIQUID USED:	HOPPER ASPIRATION SYSTEM?
VELOCITY (FT/SEC.):	W:	Lb:	FLOW RATE (GPM):	☐ YES ☑ NO
NO. TRAYS:	De:	Lc:	MAKE UP RATE (GPM):	LOUVERS?
NO. BAFFLES:	D:	S:		☐ YES ☑ NO
	TYPE OF CYCLONE:	☑ CONVENTIONAL	☐ HIGH EFFICIENCY	☐ OTHER

DESCRIBE MAINTENANCE PROCEDURES:

DESCRIBE INCOMING AIR STREAM:
Boiler flue gas

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC:

ON A SEPARATE PAGE, ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

Attach Additional Sheets As Necessary

FORM C9

CONTROL DEVICE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C9**

CONTROL DEVICE ID NO: CD-1A4, CD-1B4	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-1A, ES-1B
EMISSION POINT (STACK) ID NO(S): EP-1 (shared stack)	POSITION IN SERIES OF CONTROLS: NO. 3 OF 4 UNITS
OPERATING SCENARIO:	
1 OF 1	P.E. SEAL REQUIRED (PER 2Q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
Dry sorbent injection system will be added to control sulfur dioxide and hydrochloric acid on an as needed basis as determined by stack testing. A sodium-based dry alkaline sorbent is injected in the duct work between the mechanical dust collector and the baghouse. Sodium bicarbonate or sodium sesquicarbonate (commonly known as trona) will be used as the sorbent.

POLLUTANT(S) COLLECTED:	SO_2, HCl (if needed)			
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):				

PRESSURE DROP (IN. H_2O): ____ MIN ____ MAX Negl.	BULK PARTICLE DENSITY (LB/FT^3) N/A	
INLET TEMPERATURE (°F): 320 MIN 365 MAX	OUTLET TEMPERATURE (°F): 320 MIN 365 MAX	
INLET AIR FLOW RATE (ACFM): 91,000	OUTLET AIR FLOW RATE (ACFM): 91,000	
INLET AIR FLOW VELOCITY (FT/SEC):	OUTLET AIR FLOW VELOCITY (FT/SEC):	
INLET MOISTURE CONTENT (%):	☐ FORCED AIR ☐ INDUCED AIR	
COLLECTION SURFACE AREA (FT^2): N/A	FUEL USED: N/A	FUEL USAGE RATE: N/A

DESCRIBE MAINTENANCE PROCEDURES:
Maintenance to be performed per vendor specifications.

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:
Sodium bicarbonate or sodium sesquicarbonate (commonly known as trona) will be used as the sorbent.

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC:

ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach manufacturer's specifications, schematics, and all other drawings necessary to describe this control.

Attach Additional Sheets As Necessary

FORM C9

CONTROL DEVICE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C9**

CONTROL DEVICE ID NO: CD-1A3, CD-1B3	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ES-1A, ES-1B
EMISSION POINT (STACK) ID NO(S): EP-1 (shared stack)	POSITION IN SERIES OF CONTROLS: NO. 1 OF 4 UNITS
OPERATING SCENARIO:	
1 OF 1	P.E. SEAL REQUIRED (PER 2Q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM:
A selective non-catalytic reduction (SNCR) system will be added to each boiler to reduce NOx emissions. An ammonia or urea reagent will be injected into the post-combustion flue gas. The SNCR process involves the gas phase reaction of NOx in the flue gas (in the absence of a catalyst) with the injected ammonia/urea reagent to form nitrogen and water vapor.

POLLUTANT(S) COLLECTED:	See Attachment B - Emissions Calculations			
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	%
EFFICIENCY DETERMINATION CODE:				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):				

PRESSURE DROP (IN. H_2O): ____ MIN ____ MAX	BULK PARTICLE DENSITY (LB/FT^3): N/A
INLET TEMPERATURE (°F): 1650 MIN 1750 MAX	OUTLET TEMPERATURE (°F): 1650 MIN 1750 MAX
INLET AIR FLOW RATE (ACFM): 266,000	OUTLET AIR FLOW RATE (ACFM): 266,000
INLET AIR FLOW VELOCITY (FT/SEC):	OUTLET AIR FLOW VELOCITY (FT/SEC):
INLET MOISTURE CONTENT (%):	☐ FORCED AIR ☐ INDUCED AIR
COLLECTION SURFACE AREA (FT^2): N/A	FUEL USED: FUEL USAGE RATE:

DESCRIBE MAINTENANCE PROCEDURES:
Maintenance to be performed per vendor specifications.

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:
19% aqueous ammonia or urea will be used as the reagent.

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC:

ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS:

Attach manufacturer's specifications, schematics, and all other drawings necessary to describe this control.

Attach Additional Sheets As Necessary

FORM D1

FACILITY-WIDE EMISSIONS SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D1**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

	EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)
AIR POLLUTANT EMITTED	tons/yr	tons/yr	tons/yr
PARTICULATE MATTER (PM)	**See Attachment B - Emissions Calculations**		
PARTICULATE MATTER < 10 MICRONS (PM_{10})			
PARTICULATE MATTER < 2.5 MICRONS ($PM_{2.5}$)			
SULFUR DIOXIDE (SO_2)			
NITROGEN OXIDES (NOx)			
CARBON MONOXIDE (CO)			
VOLATILE ORGANIC COMPOUNDS (VOC)			
LEAD			
GREENHOUSE GASES (GHG) (SHORT TONS)			
OTHER			

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

		EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)
HAZARDOUS AIR POLLUTANT EMITTED	CAS NO.	tons/yr	tons/yr	tons/yr
See Attachment B - Emissions Calculations				

TOXIC AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

INDICATE REQUESTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS. EMISSIONS ABOVE THE TOXIC PERMIT EMISSION RATE (TPER) IN 15A NCAC 2Q .0711 MAY REQUIRE AIR DISPERSION MODELING. USE NETTING FORM D2 IF NECESSARY.

					Modeling Required ?		
TOXIC AIR POLLUTANT EMITTED	CAS NO.	lb/hr	lb/day	lb/year	Yes	No	
See Attachment B - Emissions Calculations							

COMMENTS:

Attach Additional Sheets As Necessary

FORM D2

AIR POLLUTANT NETTING WORKSHEET AND FACILITY-WIDE EMISSION SUMMARY

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **D2**

PURPOSE OF NETTING: AIR TOXICS

TOXIC AIR POLLUTANT: See Table 3 of Appendix B - Emissions Calculations CAS NO.:

EMISSION SOURCE ID NOS.:

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES			
Summarize in this section using the B forms	EMISSIONS - USE APPROPRIATE COLUMNS ONLY		
	LB/YEAR	LB/DAY	LB/HR
MODIFICATION INCREASE	See Table 3 of Appendix B - Emissions Calculations		
- MINUS -	- MINUS -	- MINUS -	- MINUS -
MODIFICATION DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CHANGE FROM MODIFICATION			
SECTION B - FACILITY-WIDE EMISSION NETTING ANALYSIS			
CREDITABLE INCREASE	See Table 3 of Appendix B - Emissions Calculations		
- MINUS -	- MINUS -	- MINUS -	- MINUS -
CREDITABLE DECREASE			
= EQUALS =	= EQUALS =	= EQUALS =	= EQUALS =
NET CREDITABLE CHANGE			
SECTION C - FACILITY-WIDE EMISSIONS			
TOTAL FACILITY EMISSIONS	See Table 3 of Appendix B - Emissions Calculations		
TPER LEVELS (2Q .0711)			

Are the total facility-wide emissions less than the TPER levels?: ☐ YES ☑ NO

If YES, no further analysis is required.

Air dispersion modeling analysis is required if the total facility-wide emission level is **greater than the 2Q .0711 Toxic** Air Pollutant Permitting Emissions Rate (TPER) and the source emitting the toxic air pollutant is not exempted by 15A NCAC 2Q .0702(a)(27) "Exemptions".

CHECK HERE IF AN AIR DISPERSION MODELING ANALYSIS IS REQUIRED ☐

If air dispersion modeling analysis is required, complete the stack parameters section of Form D3-1 for each emission source that emits this TAP. Review the modeling plan requirements.

COMMENTS:

Exempt from air dispersion modeling analysis per 15A NCAC 2Q .0702(a)(27)(b), as the facility is subject to 40 CFR 63 Subpart JJJJJJ (Area Source Boiler MACT).

Attach Additional Sheets As Necessary

FORM D2A

AIR POLLUTANT "PROJECT ONLY" NETTING WORKSHEET

REVISED 09/22/16 NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operat **D2A**

PURPOSE OF NETTING: PREVENTION OF SIGNIFICANT DETERIORATION (PSD)	
PSD AIR POLLUTANT: See Table 1 of Attachment B - Emissions Calculations	
EMISSION SOURCE ID NO. AND DESCRIPTION:	
EMISSION SOURCE ID NO. AND DESCRIPTION:	
EMISSION SOURCE ID NO. AND DESCRIPTION:	
EMISSION SOURCE ID NO. AND DESCRIPTION:	
SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES IN PROJECT	
Summarize in this section using the B forms	EMISSIONS TONS/YR
MODIFICATION INCREASE	
- MINUS -	
MODIFICATION DECREASE	
= EQUALS =	
"PROJECT" NET CHANGE FROM MODIFICATION	
PSD SIGNIFICANCE LEVEL FOR SPECIFIC POLLUTANT [40 CFR 51.166(b)(23)]	
IS THE "PROJECT" NET CHANGE LESS THAN THE SIGNIFICANCE LEVEL? ☐ YES ☐ NO	
If YES, no further analysis is required.	
If NO, then a further evaluation should be done using creditable emissions at the facility for each specific pollutant over a contemporaneous time period.	
COMMENTS:	

Attach Additional Sheets As Necessary

FORM D4

EXEMPT AND INSIGNIFICANT ACTIVITIES SUMMARY

REVISED 09/22/16 NCDENR/Division of Air Quality - Application for Air Permit to Construct/Operate **D4**

ACTIVITIES EXEMPTED PER 2Q .0102 OR INSIGNIFICANT ACTIVITIES PER 2Q .0503 FOR TITLE V SOURCES

DESCRIPTION OF EMISSION SOURCE	SIZE OR PRODUCTION RATE	BASIS FOR EXEMPTION OR INSIGNIFICANT ACTIVITY
1. Diesel Storage Tank (Source ID No. IES-2)	500 gallons	15A NCAC 2Q .0503 (8)
2. Fire Pump Fuel Oil Storage Tank (Source ID No. IES-3)	250 gallons	15A NCAC 2Q .0503 (8)
3. Solvent Parts Cleaner (Source ID No. IES-4)	20 gallons	15A NCAC 2Q .0503 (8)
4. Turbine Lube Oil Tank Vent (Source ID No. IES-5)	950 gallons	15A NCAC 2Q .0503 (8)
5. Cooling Tower (Source ID No. IES-6)	19,190 gpm	15A NCAC 2Q .0503 (8)
6. Truck Dumper No.1 for Receiving Biomass Fuel (Source ID No. IES-8)	96.0 tons/hour	15A NCAC 2Q .0503 (8)
7. Truck Dumper No.2 for Receiving Biomass Fuel (Source ID No. IES-9)	96.0 tons/hour	15A NCAC 2Q .0503 (8)
8. Fuel Storage Piles (Source ID No. IES-10)	Approx. 2.2 acres	15A NCAC 2Q .0503 (8)
9. Fuel Material Handling (including conveyors, front-end loader/dozer and other vehicular traffic in the fuel yard) (Source ID No. IES-11)	44.0 tons/hour	15A NCAC 2Q .0503 (8)
10. Paved Roads (Source ID No. IES-12A)	9,680 VMT/yr	15A NCAC 2Q .0503 (8)
11. Unpaved Roads (Source ID No. IES-12B)	6,000 VMT/yr	15A NCAC 2Q .0503 (8)
12. Sorbent Silo (Source ID No. IES-13)	657 tons/year	15A NCAC 2Q .0503 (8)
13. Poultry Litter Storage (Source ID No. IES-16)		15A NCAC 2Q .0503 (8)
14.		
15.		
16.		
17.		

Attach Additional Sheets As Necessary

Received
MAR 29 2017
Air Permits Section

FORM D5

TECHNICAL ANALYSIS TO SUPPORT PERMIT APPLICATION

REVISED 09/22/16 NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate **D5**

PROVIDE DETAILED TECHNICAL CALCULATIONS TO SUPPORT ALL EMISSION, CONTROL, AND REGULATORY DEMONSTRATIONS MADE IN THIS APPLICATION. INCLUDE A COMPREHENSIVE PROCESS FLOW DIAGRAM AS NECESSARY TO SUPPORT AND CLARIFY CALCULATIONS AND ASSUMPTIONS. ADDRESS THE FOLLOWING SPECIFIC ISSUES ON SEPARATE PAGES:

A **SPECIFIC EMISSIONS SOURCE (EMISSION INFORMATION) (FORM B and B1 through B9)** - SHOW CALCULATIONS USED, INCLUDING EMISSION FACTORS, MATERIAL BALANCES, AND/OR OTHER METHODS FROM WHICH THE POLLUTANT EMISSION RATES IN THIS APPLICATION WERE DERIVED. INCLUDE CALCULATION OF POTENTIAL BEFORE AND, WHERE APPLICABLE, AFTER CONTROLS. CLEARLY STATE ANY ASSUMPTIONS MADE AND PROVIDE ANY REFERENCES AS NEEDED TO SUPPORT MATERIAL BALANCE CALCULATIONS.

B **SPECIFIC EMISSION SOURCE (REGULATORY INFORMATION)(FORM E2 - TITLE V ONLY)** - PROVIDE AN ANALYSIS OF ANY REGULATIONS APPLICABLE TO INDIVIDUAL SOURCES AND THE FACILITY AS A WHOLE. INCLUDE A DISCUSSION OUTING METHODS (e.g. FOR TESTING AND/OR MONITORING REQUIREMENTS) FOR COMPLYING WITH APPLICABLE REGULATIONS, PARTICULARLY THOSE REGULATIONS LIMITING EMISSIONS BASED ON PROCESS RATES OR OTHER OPERATIONAL PARAMETERS. PROVIDE JUSTIFICATION FOR AVOIDANCE OF ANY FEDERAL REGULATIONS (PREVENTION OF SIGNIFICANT DETERIORATION (PSD), NEW SOURCE PERFORMANCE STANDARDS (NSPS), NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS), TITLE V), INCLUDING EXEMPTIONS FROM THE FEDERAL REGULATIONS WHICH WOULD OTHERWISE BE APPLICABLE TO THIS FACILITY. SUBMIT ANY REQUIRED INFORMATION TO DOCUMENT COMPLIANCE WITH ANY REGULATIONS. INCLUDE EMISSION RATES CALCULATED IN ITEM "A" ABOVE, DATES OF MANUFACTURE, CONTROL EQUIPMENT, ETC. TO SUPPORT THESE CALCULATIONS.

C **CONTROL DEVICE ANALYSIS (FORM C and C1 through C9)** - PROVIDE A TECHNICAL EVALUATION WITH SUPPORTING REFERENCES FOR ANY CONTROL EFFICIENCIES LISTED ON SECTION C FORMS, OR USED TO REDUCE EMISSION RATES IN CALCULATIONS UNDER ITEM "A" ABOVE. INCLUDE PERTINENT OPERATING PARAMETERS (e.g. OPERATING CONDITIONS, MANUFACTURING RECOMMENDATIONS, AND PARAMETERS AS APPLIED FOR IN THIS APPLICATION) CRITICAL TO ENSURING PROPER PERFORMANCE OF THE CONTROL DEVICES). INCLUDE AND LIMITATIONS OR MALFUNCTION POTENTIAL FOR THE PARTICULAR CONTROL DEVICES AS EMPLOYED AT THIS FACILITY. DETAIL PROCEDURES FOR ASSURING PROPER OPERATION OF THE CONTROL DEVICE INCLUDING MONITORING SYSTEMS AND MAINTENANCE TO BE PERFORMED.

D **PROCESS AND OPERATIONAL COMPLIANCE ANALYSIS - (FORM E3 - TITLE V ONLY)** - SHOWING HOW COMPLIANCE WILL BE ACHIEVED WHEN USING PROCESS, OPERATIONAL, OR OTHER DATA TO DEMONSTRATE COMPLIANCE. REFER TO COMPLIANCE REQUIREMENTS IN THE REGULATORY ANALYSIS IN ITEM "B" WHERE APPROPRIATE. LIST ANY CONDITIONS OR PARAMETERS THAT CAN BE MONITORED AND REPORTED TO DEMONSTRATE COMPLIANCE WITH THE APPLICABLE REGULATIONS.

E **PROFESSIONAL ENGINEERING SEAL** - PURSUANT TO 15A NCAC 2Q .0112 "APPLICATION REQUIRING A PROFESSIONAL ENGINEERING SEAL," A PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA SHALL BE REQUIRED TO SEAL TECHNICAL PORTIONS OF THIS APPLICATION FOR NEW SOURCES AND MODIFICATIONS OF EXISTING SOURCES. (SEE INSTRUCTIONS FOR FURTHER APPLICABILITY).

I, Lisa Manning *attest that this application for* North Carolina Renewable Power - Lumberton, LLC *has been reviewed by me and is accurate, complete and consistent with the information supplied in the engineering plans, calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the proposed design has been prepared in accordance with the applicable regulations. Although certain portions of this submittal package may have been developed by other professionals, inclusion of these materials under my seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design. Note: In accordance with NC General Statutes 143-215.6A and 143-215.6B, any person who knowingly makes any false statement, representation, or certification in any application shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed $10,000 as well as civil penalties up to $25,000 per violation.*

(PLEASE USE BLUE INK TO COMPLETE THE FOLLOWING)

NAME: Lisa Manning
DATE: 3/27/2017
COMPANY: Headwaters Restoration, PLLC #P-1632
ADDRESS: 76 Starnes Ave, Asheville, NC 28801
TELEPHONE: 828-450-3980
SIGNATURE: Lisa A. Manning
PAGES CERTIFIED: Permit Application + supporting documents Forms AA, A2/A3, B1, C1, C4, C9, D1, D2, D2A, D4, D5, E1, E2, E3, E4, E5, E6, Narrative, Calcs, Report

(IDENTIFY ABOVE EACH PERMIT FORM AND ATTACHMENT THAT IS BEING CERTIFIED BY THIS SEAL)

PLACE NORTH CAROLINA SEAL HERE

NORTH CAROLINA PROFESSIONAL SEAL 034307 ENGINEER LISA A. MANNING

Lisa A. Manning 3-27-17

Attach Additional Sheets As Necessary

FORM E1

TITLE V GENERAL INFORMATION

REVISED 06/01/16 NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate **E1**

IF YOUR FACILITY IS CLASSIFIED AS "MAJOR" FOR TITLE V YOU MUST COMPLETE THIS FORM AND ALL OTHER REQUIRED "E" FORMS (E2 THROUGH E5 AS APPLICABLE)

Indicate here if your facility is subject to Title V by: ☑ EMISSIONS ☑ OTHER

If subject to Title V by "OTHER", specify why: ☐ NSPS ☐ NESHAP (MACT) ☑ TITLE IV

☐ OTHER (specify) ______

If you are or will be subject to any maximum achievable control technology standards (MACT) issued pursuant to section 112(d) of the Clean Air Act, specify below:

EMISSION SOURCE ID	*EMISSION SOURCE DESCRIPTION*	*MACT*
ES-1A	Wood and poultry litter fired boiler	40 CFR 63 Subpart JJJJJJ
ES-1B	Wood and poultry litter fired boiler	40 CFR 63 Subpart JJJJJJ
ES-1	Emergency Fire Pump	40 CFR 63 Subpart ZZZZ

List any additional regulation which are requested to be included in the shield and provide a detailed explanation as to why the shield should be granted:

REGULATION	*EMISSION SOURCE (Include ID)*	*EXPLANATION*

Comments:

Attach Additional Sheets As Necessary

FORM E2

EMISSION SOURCE APPLICABLE REGULATION LISTING

REVISED 09/22/16 NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate **E2**

EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	OPERATING SCENARIO INDICATE PRIMARY (P) OR ALTERNATIVE (A)	POLLUTANT	APPLICABLE REGULATION
ES 1	*Coal/Wood Boiler*	*P - Coal*	*PM*	*NCAC 2D .0503*
		A - Wood	*PM*	*NCAC 2D .0504*
ES-1A, ES-1B	Wood/Poultry Litter Boiler	P - Wood/Poultry Litter	PM	NCAC 02D .0504, NCAC 02D .0524, NCAC 02D .0614, PSD BACT
			SO2	NCAC 02D .0516, SB3, NCAC 02Q .0317, NCAC 02Q .0402, 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC, PSD BACT
			Visible Emissions	NCAC 02D .0524
			CO	NCAC 02D .0530, NCAC 02Q .0317, PSD BACT
			Sulfuric Acid Mist	NCAC 02D .0530, PSD BACT
			HAPs	NCAC 02D .1111, NCAC 02Q .0317
			NOx	NCAC 02Q .0317, NCAC 02Q .0402, 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC, PSD BACT
			VOC	PSD BACT
			Mercury	SB3 BACT
			Odors	NCAC 02D .1806

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

		Regulated Pollutant	PM
Emission Source ID NO.	**ES-1A, ES-1B**	Applicable Regulation	NCAC 02D .0504, NCAC 02D .0524, NCAC 02D .0614, SB3
Alternative Operating Scenario (AOS) NO:			

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☑ Yes ☐ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☑ Yes ☐ No

Describe Monitoring Device Type: Pressure drop indicator; Continuous Opacity Monitors (COMS)

Describe Monitoring Location: On each bagfilter; On stack

Other Monitoring Methods (Describe In Detail): Monthly external visual inspection of system ductwork and material collection unit for leaks. Annual internal inspection of the control devices' structural integrity.

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

The pressure drop is recorded at least once weekly when the boiler is operating. The 6-minute average opacity is determined by the COMS.

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: See below.

Frequency of recordkeeping (How often is data recorded?): Date/time of each recorded action; pressure drop (once weekly while the boiler is operating); periods of boiler downtime (weekly); results of each inspection (monthly or annual, based on requirement); results of maintenance (varies); variance from manufacturer's recommendations and corrections made (as needed). Opacity (6-minute average opacity from COMS).

REPORTING REQUIREMENTS

Generally describe what is being reported: Summary of monitoring and recordkeeping activities; when requested, maintenance performed on multiclones or bagfilters. Excess emission reports.

Frequency: ☐ MONTHLY ☐ QUARTERL ☑ EVERY SIX MONTHS

☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: Per permit's General Condition JJ; Methods 3A/3B, 5/5B, 17, 1, 9

Specify reference test method rule and citation: Per permit's General Condition JJ; reference methods in 40 CFR 60.46b(d)(1)-(7)

Specify testing frequency: As required; initial

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

Regulated Pollutant	SO_2
Emission Source ID NO. **ES-1A, ES-1B** Applicable Regulation	NCAC 02D .0516, NCAC 02Q .0317, NCAC 02Q .0402, SB3, 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC
Alternative Operating Scenario (AOS) NO:	

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: SO_2 Continuous Emissions Monitoring System (CEMS)

Describe Monitoring Location: Stack

Other Monitoring Methods (Describe In Detail): N/A

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

1-minute instantaneous readings taken to produce an hourly averge.

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: SO_2 emissions

Frequency of recordkeeping (How often is data recorded?) 1-minute instantaneous readings taken to produce an hourly averge.

REPORTING REQUIREMENTS

Generally describe what is being reported: Semiannual summary report including facility wide SO_2 emissions and any permit deviations.

Frequency: ☐ MONTHLY ☐ QUARTERI ☑ EVERY SIX MONTHS

☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: Per permit's General Condition JJ

Specify reference test method rule and citation: Per permit's General Condition JJ

Specify testing frequency: Initial and as-required thereafter.

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

		Regulated Pollutant	Visible Emissions
Emission Source ID NO.	**ES-1A, ES-1B**	Applicable Regulation	NCAC 02D .0524
Alternative Operating Scenario (AOS) NO:			

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: COMS

Describe Monitoring Location: On stack

Other Monitoring Methods (Describe In Detail): N/A

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

6-minute averages.

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: Opacity

Frequency of recordkeeping (How often is data recorded?): The data is recorded as 6-minute averages.

REPORTING REQUIREMENTS

Generally describe what is being reported: Excess emission reports. Monitoring and recordkeeping activities.

Frequency: ☐ MONTHLY ☐ QUARTERI ☑ EVERY SIX MONTHS

☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: N/A

Specify reference test method rule and citation: N/A

Specify testing frequency: N/A

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 | **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** | **E3**

		Regulated Pollutant	CO
Emission Source ID NO.	**ES-1A, ES-1B**	Applicable Regulation	NCAC 02D .0530, NCAC 02Q .0317
Alternative Operating Scenario (AOS) NO:			

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: CO CEMS

Describe Monitoring Location: Stack

Other Monitoring Methods (Describe In Detail): N/A

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

1 minute instantaneous readings taken to produce an hourly average.

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: CO emissions

Frequency of recordkeeping (How often is data recorded?): 1-minute instantaneous readings taken to produce an hourly average. Emissions are calculated monthly.

REPORTING REQUIREMENTS

Generally describe what is being reported: Semiannual summary report including facility wide CO emissions and any permit deviations.

Frequency: ☐ MONTHLY ☐ QUARTERI ☑ EVERY SIX MONTHS

☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: Per permit's General Condition JJ

Specify reference test method rule and citation: Per permit's General Condition JJ

Specify testing frequency: Initial; as required.

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

Emission Source ID NO. **ES-1A, ES-1B**	Regulated Pollutant: Sulfuric Acid Mist Applicable Regulation: NCAC 02D .0530
Alternative Operating Scenario (AOS) NO:	

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: N/A

Describe Monitoring Location: N/A

Other Monitoring Methods (Describe In Detail): N/A

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

N/A

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: N/A

Frequency of recordkeeping (How often is data recorded?): N/A

REPORTING REQUIREMENTS

Generally describe what is being reported: N/A

Frequency: ☐ MONTHLY ☐ QUARTERI ☐ EVERY 6 MONTHS

☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: Per permit's General Condition JJ

Specify reference test method rule and citation: Per permit's General Condition JJ

Specify testing frequency: Initial; as-required.

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

Emission Source ID NO. **ES-1A, ES-1B**

Regulated Pollutant: Hazardous Air Pollutants (HAP)

Applicable Regulation: NCAC 02D .1111, NCAC 02Q .0317

Alternative Operating Scenario (AOS) NO:

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: N/A

Describe Monitoring Location: N/A

Other Monitoring Methods (Describe In Detail): N/A

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

N/A

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: N/A

Frequency of recordkeeping (How often is data recorded?): HCl and Cl are estimated on a monthly and 12-month basis using fuel usage and emission factors prescribed in the permit.

REPORTING REQUIREMENTS

Generally describe what is being reported: Annual Compliance Certification. Semiannual summary report including monitoring and recordkeeping activities, monthly & 12-month rolling HCl and chlorine emissions from the boilers, total HAP emissions from the boilers, and any permit deviations.

Frequency: ☐ MONTHLY ☐ QUARTERI ☑ EVERY SIX MONTHS

☑ OTHER (DESCRIBE): ANNUAL

TESTING

Specify proposed reference test method: DAQ Approved Test Method; Per permit's General Condition JJ.

Specify reference test method rule and citation: NCAC 02D .2601; Per permit's General Condition JJ.

Specify testing frequency: Initial; as required.

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 — **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** — **E3**

Regulated Pollutant	NOx
Emission Source ID NO. **ES-1A, ES-1B** — Applicable Regulation	NCAC 02Q .0317, NCAC 02Q .0402, 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC, SB3

Alternative Operating Scenario (AOS) NO:

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: NOx CEMS

Describe Monitoring Location: Stack

Other Monitoring Methods (Describe In Detail): N/A

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

1-minute instantaneous readings taken to produce an hourly average.

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: NOx emissions

Frequency of recordkeeping (How often is data recorded?): 1-minute instantaneous readings taken to produce an hourly average.

REPORTING REQUIREMENTS

Generally describe what is being reported: Summary of monitoring and recordkeeping activities. Semiannual summary report including facility wide NOx emissions and any permit deviations.

Frequency: ☐ MONTHLY ☐ QUARTERL ☑ EVERY SIX MONTHS ☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: Per permit's General Condition JJ

Specify reference test method rule and citation: Per permit's General Condition JJ

Specify testing frequency: Initial; as required.

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

		Regulated Pollutant	Volatile Organic Compounds
Emission Source ID NO.	**ES-1A, ES-1B**	Applicable Regulation	SB3
Alternative Operating Scenario (AOS) NO:			

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: N/A

Describe Monitoring Location: N/A

Other Monitoring Methods (Describe In Detail): N/A

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

N/A

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: N/A

Frequency of recordkeeping (How often is data recorded?): N/A

REPORTING REQUIREMENTS

Generally describe what is being reported: N/A

Frequency: ☐ MONTHLY ☐ QUARTERI ☐ EVERY 6 MONTHS

☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: Per permit's General Condition JJ

Specify reference test method rule and citation: Per permit's General Condition JJ

Specify testing frequency: Initial; as-required.

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E3

EMISSION SOURCE COMPLIANCE METHOD

REVISED 9/22/16 **NCDENR/Division Of Air Quality - Application for Air Permit to Construct/Operate** **E3**

		Regulated Pollutant	Mercury
Emission Source ID NO.	**ES-1A, ES-1B**	Applicable Regulation	SB3
Alternative Operating Scenario (AOS) NO:			

ATTACH A SEPARATE PAGE TO EXPAND ON ANY OF THE BELOW COMMENTS

MONITORING REQUIREMENTS

Is Compliance Assurance Monitoring (CAM) 40 CFR Part 64 Applicable? ☐ Yes ☑ No

If yes, is CAM Plan Attached (if applicable, CAM plan must be attached)? ☐ Yes ☐ No

Describe Monitoring Device Type: Same as PM.

Describe Monitoring Location: Same as PM.

Other Monitoring Methods (Describe In Detail): Same as PM.

Describe the frequency and duration of monitoring and how the data will be recorded (i.e., every 15 minutes, 1 minute instantaneous readings taken to produce an hourly average):

Same as PM.

RECORDKEEPING REQUIREMENTS

Data (Parameter) being recording: Same as PM.

Frequency of recordkeeping (How often is data recorded?): Same as PM.

REPORTING REQUIREMENTS

Generally describe what is being reported: Same as PM.

Frequency: ☐ MONTHLY ☐ QUARTERI ☑ EVERY SIX MONTHS

☐ OTHER (DESCRIBE):

TESTING

Specify proposed reference test method: Same as PM.

Specify reference test method rule and citation: Same as PM.

Specify testing frequency: Same as PM.

NOTE - Proposed test method subject to approval and possible change during the test protocol process

Attach Additional Sheets As Necessary

FORM E4

EMISSION SOURCE COMPLIANCE SCHEDULE

COMPLIANCE STATUS WITH RESPECT TO ALL APPLICABLE REQUIREMENTS

Will each emission source at your facility be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements?

☐ YES ☑ NO **If NO**, complete **A** through **F** below for each requirement for which compliance is not achieved.

Will your facility be in compliance with all applicable requirements taking effect during the term of the permit and meet such requirements on a timely basis?

☐ YES ☑ NO **If NO**, complete **A** through **F** below for each requirement for which compliance is not achieved.

If this application is for a modification of existing emissions source(s), is each emission source currently in compliance with all applicable requirements?

☐ YES ☑ NO **If NO**, complete **A** through **F** below for each requirement for which compliance is not achieved.

A. Emission Source Description (Include ID NO.) ES-1A & ES-1B Boilers A & B

B. Identify applicable requirement for which compliance is not achieved:

Permit Condition limits CO emissions to less than 250 tons per 12 consecutive months. This limit may be exceeded temporarily in accordance with Special Order by Consent.

C. Narrative description of how compliance will be achieved with this applicable requirements:

PSD permit application to be submitted.

D. Detailed Schedule of Compliance:

Step(s)	Date Expected
See Special Order by Consent	

E. Frequency for submittal of progress reports (6 month minimum):

See Special Order by Consent.

F. Starting date of submittal of progress reports: See Special Order by Consent.

Attach Additional Sheets As Necessary

FORM E5

TITLE V COMPLIANCE CERTIFICATION (Required)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **E5**

In accordance with the provisions of Title 15A NCAC 2Q .0520 and .0515(b)(4) the responsible company official of:

Received
MAR 2 9 2017
Air Permits Section

SITE NAME: North Carolina Renewable Power - Lumberton, LLC

SITE ADDRESS: 1866 Hestertown Road

CITY, NC : Lumberton, NC 28358

COUNTY: Robeson

PERMIT NUMBER : 05543T23

CERTIFIES THAT (Check the appropriate statement(s):

- ☐ The facility is in compliance with all applicable requirements
- ☐ In accordance with the provisions of Title 15A NCAC 2Q .0515(b)(4) the responsible company official certifies that the proposed minor modification meets the criteria for using the procedures set out in 2Q .0515 and requests that these procedures be used to process the permit application.
- ☑ The facility is not currently in compliance with all applicable requirements
  If this box is checked, you must also complete Form E4 "Emission Source Compliance Schedule"

The undersigned certifies under the penalty of law, that all information and statements provided in the application, based on information and belief formed after reasonable inquiry, are true, accurate, and complete.

Signature of responsible company official **(REQUIRED, USE BLUE INK)** **Date:** 3-24-17

Steven R. Ingle, Vice President - Engineering
Name, Title of responsible company official (Type or print)

Attach Additional Sheets As Necessary

FORM E6

COMPLIANCE ASSURANCE MONITORING (CAM) PLAN (4 pages)

For CAM-affected emission units, the applicant must submit additional information in the form of a CAM Plan as required under 40 CFR 64.

For information about the CAM rule and this form, please refer to 40 CFR 64 and 15A NCAC 2D .0614.
Additional information (including guidance documents may be found at the following URLs:

https://www3.epa.gov/ttn/emc/cam.html
https://deq.nc.gov/about/divisions/air-quality/air-quality-enforcement/compliance-assurance-monitoring

SOURCE INFORMATION		
1.	**Facility Name:**	North Carolina Renewable Power - Lumberton, LLC
2.	**Permit Number:**	05543T23
3.	**Date Form Prepared:**	March 1, 2017

BASIS OF CAM SUBMITTAL

4. Mark the appropriate box below as to why this CAM Plan is being submitted as part of this application:

☐ **Renewal Application:** ALL Emission Units (Pollutant Specific Emission Units [PSEUs] considered separately with respect to EACH regulated air pollutant) for which a CAM Plan has NOT yet been approved needs to be addressed in this CAM Plan submittal.
See Renewal Procedures per 15 A NCAC 2Q .0513.

☐ **Initial Application (Submitted after 4/20/1998):** Only large PSEUs (PSEUs with potential post control device emissions of an applicable regulated air pollutant that are equal to or greater than major source threshold levels) need to be addressed in this CAM Plan submittal.
See Initial Application Procedures per 15A NCAC 2Q .0505(1).

☑ **Significant Modification to Large PSEUs:** Only large PSEUs (PSEUs with potential post control device emissions of an applicable regulated air pollutant that are equal to or greater than major source threshold levels) being modified after 4/20/1998 need to be addressed in this CAM Plan submittal.
For large PSEUs with an approved CAM Plan, only address the appropriate monitoring requirements affected by the significant modification.
See Significant Modification Procedures per 15 A NCAC 2Q .0516.

CAM APPLICABILITY DETERMINATION

5. To determine CAM applicability, a PSEU must meet ALL of the following criteria (If not, then the remainder of this form need not be completed):

A. The PSEU is located at a major source;
B. The PSEU is subject to an emission limitation or standard for the applicable regulated air pollutant that is NOT exempt;
List of EXEMPT Emission Limitations or Standards below OR as provided in 15A NCAC 2Q .0614(b)(1):
- NSPS (40 CFR Part 60) or NESHAP (40 CFR Part 61 and 63) proposed after 11/15/1990.
- Stratospheric ozone protection requirements.
- Acid Rain program requirements.
- Emission limitations or standards for which a Title V permit specifies a continuous compliance determination method, as defined in the CAM rule (40 CFR 64.1), Continuous Compliance Determination Method.
- An emission cap that meets the requirements specified in 40 CFR 70.4(b)(12).

*If the PSEU is subject to both **Exempt** and **Not Exempt** emission standards for the same pollutant, then the facility is required to determine the CAM applicability for **Not Exempt** **emission** standards.*

C. The PSEU uses an add-on control device to achieve compliance with an emission limitation or standard;
D. The PSEU has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than major source threshold levels; **and**
E. The PSEU is **NOT** an exempt backup utility power emission unit that is municpally owned and appropriately documentd as provided in 15A NCAC 2D .0614(b)(2).

Attach Additional Sheets As Necessary

BACKGROUND DATA AND INFORMATION	E6-2

6. Complete the following table for ALL PSEUs that need to be addressed in this CAM Plan submittal. This section is to be used to provide background data and information for each PSEU in order to supplement the submittal requirements specified in 40 CFR 64.4.
If additional space is needed, please attach and label additional sheets as appropriate.

PSEU Designation	PSEU Description	Pollutant	Control Device	[a]Emission Limitation OR Standard	[b]Monitoring Requirement
ES-1A & 1B	Boilers A & B	$PM/PM_{10}/PM_{2.5}$	Baghouse	0.03/0.036/0.031 lb/MMBtu	Continuous Opacity Monitoring System (COMS)

[a] Indicate the emission limitation or standard for any applicable requirement that constitutes an emisson limitation, emission standard, or standard of performance. Examples of emission limitations or standards may include a permitted emission limitation, applicable regulations, work practices, process or control device parameters, or other forms of specific design, equipment, operational or maintenance requirements.

[b] Indicate the monitoring requirements for the control device that are required by an applicable regulation or permit condition.

Attach Additional Sheets As Necessary

[a] CAM MONITORING APPROACH CRITERIA	E6-3

7. **Complete this section for EACH PSEU and for each affected pollutant that needs to be addressed in this CAM Plan submittal. This section may be copied as needed for each PSEU. This section is to be used to provide monitoring data and information for EACH indicator selected for EACH PSEU in order to meet the monitoring design criteria specified in 40 CFR 64.3 and 64.4. If more than two indicators are being selected for a PSEU or if additional space is need, attach and label with the apprtopriate PSEU designation, pollutant, and indicator Nos.**

	PSEU DESIGNATION	POLLUTANT	[b] INDICATOR NO. 1	[b] INDICATOR NO. 2
7a.	General Criteria Describe the monitoring approach used to measure the indicators.	PM/PM10/PM2.5	Opacity	
	[c] Establish the appropriate indicator range or the procedures for establishing the indicator range which provides a reasonable assurance of compliance	PM/PM10/PM2.5	Any 3-hour block average opacity > 12 percent	
	[d] Provide Quality Improvement Plan (QIP) Threshold levels.	PM/PM10/PM2.5	Any 4 excursions within any 6-month period	
7b.	Performance criteria Provide the Specification for Obtaining Representative Data (*Such as detector location and installation specifications*).	PM/PM10/PM2.5	The COMS shall be installed, in accordance with 40 CFR 60 App B, Perf Spec 1 and App F, Proc 3.	
	Provide Quality Assurance and Quality Control (QA/QC) Practices that are adequate to ensure the continuing validity of the data, considering manufacturerer's recommendations	PM/PM10/PM2.5	The COMS shall be calibrated, in accordance with 40 CFR 60 App B, Perf Spec 1 and App F, Proc 3.	
	[e] Provide the Monitoring Frequency Provide the Data Collection Procedures that will be used	PM/PM10/PM2.5	Continuous The COMS shall be operated and maintained in accordance with manufacturer's recommendations.	
	Provide the Data Averaging Period for the purpose of determining whether an excursion or exceedance has occurred.	PM/PM10/PM2.5	3-hour block averages	

[a] If a Continuous Emission Monitoring System (CEMS), Continuous Opacity Monitoring System (COMS), or Predictive Emission Monitoring System (PEMS) is used, then this section need not be completed **ONLY** for the CEMS, COMS, or PEMS, **EXCEPT** that the Special Criteria Information of 40 CFR 64.3(d) must be provided. Special Criteria Information may be provided on a separate sheet.

[b] Describe all indicators to be monitored which satisfy 40 CFR 64.3(a). Indicators of emission control performance for the control device and associated capture system may include measured or predicted emissions (including visible emissions or opacity), process and control device operating parameters that affect control device (and capture system) efficiency or emission rates, or recorded findings of inspection and maintenance activities.

[c] Indicator ranges may be based on a single maximum or minimum value or at multiple levels that are relevant to distinctly different operating conditions, expressed as a function of process variables, expressed as maintaining the applicable indicator in a particular operational status or designated condition, or established as interdependent between more than one indicator. In addition, unless specifically stated otherwise by an applicable requirement, the owner or operator shall monitor the indicators to detect any **bypass** of the control deivce (or capture system) to the atmosphere.

[d] The QIP threshold is based on the number of excursions identified in a reporting period. (Example: if the historical monitoring data for a facility indicates that the indicator range was exceeded 10 times in a 6-month period, the threshold could be established at no more than 10 excursions outside the indicator range during a 6-month reporting period.) The threshold levels also could be established based on the duration of excursions as a percentage of operating time.

[e] At a minimum, the owner of a large PSEU must collect four or more data values equally spaced over each hour and average the values. All other PSEUs must collect data **at least once** per 24-hour period *or possibly* ***more*** to provide reasonable assurance of compliiance over the anticipated range of operating conditions.

RATIONALE AND JUSTIFICATION	E6-4

8. **Complete this section for EACH PSEU and for each affected pollutant that needs to be addressed in this CAM Plan submittal. This section *may be copied as needed*. Use this section to provide monitoring data and information for EACH indicator selected for EACH PSEU in order to meet the monitoring design criteria specified in 40 CFR 64.3 and 64.4. If more than two indicators are being selected for a PSEU or if additional speace is needed, attach additional sheets and label with the appropriate PSEU designation, pollutant, and indicator Nos.**

PSEU DESIGNATION	POLLUTANT

9. INDICATORS AND THE MONITORING APPROACH: Provide the rationale and justification for the selection of the indicators and the monitoring approach used to measure the indicators. Also provide any data suporting the rationale and justification. Explain the reasons for any differences between the verification of operational status or the quality assurance and control practices proposed and the manufacturer's recommendations. (If addiional space is needed, attach and label with the appropirate PSEU designation and pollutant).

Opacity is an appropriate surrogate for PM emissions and control device effectiveness. The opacity of the PM emissions will be monitored in the stack continuously.

10. **INDICATOR RANGES:** Provide the rationale and justification for the selection of the indicator ranges. The rationale and justification shall indicate how **EACH** indicator range was selected by either a Compliance or Performance Test, a Test Plan and Schedule, or by Engineering Assessments. Depending on which method is being used for each indicator range, include the specific information required below for that specific indicator range. (If additional space is needed, attach and label with the appropriate PSEU designation and pollutant):

- COMPLIANCE or PERFORMANCE TEST (Indicator ranges determined from control device operating parameter data obtained during a compliance or performance test conducted under regulatory specified conditions or under conditions representative of maximum potential emissions under anticipated operating conditions. Such data may be supplemented by engineering assessments and manufacturer's recommendations). The rationale and justification shall **include** a summary of the compliance or performance test results that were used to determine the indicator range and documentation indicating that no changes have taken place that could result in a significant change in the control system perfomrnace or the selected indicator ranges since the compliance or performante test was conducted and approved by DAQ.

- TEST PLAN AND SCHEDULE (Indicator ranges will be determined from a proposed implementation plan and schedule for installing, testing, and performing any other appropriate activities prior to use of the monitoring). The rationale and justification shall **include** the proposed implementation plan and schedule that will provide for use of the monitoring as expeditiously as practical after approval of this CAM Plan, but in no case shall the schedule for completing installation and beginning operation of the minitoring exceed 180 days after approval.

- ENGINEERING ASSESSMENTS (Indicator ranges or the procedures for establishing indicator ranges are determined from engineering assessments and other data, such as manufacturer's design criteria and historical monitoring data, because factors specific to the type of monitoring, control device, or PSEU make compliance or performance testing unnecessary). The rationale and justification shall **include** documentaion demonstrating that compliance testing is not required to establish the indicator range.

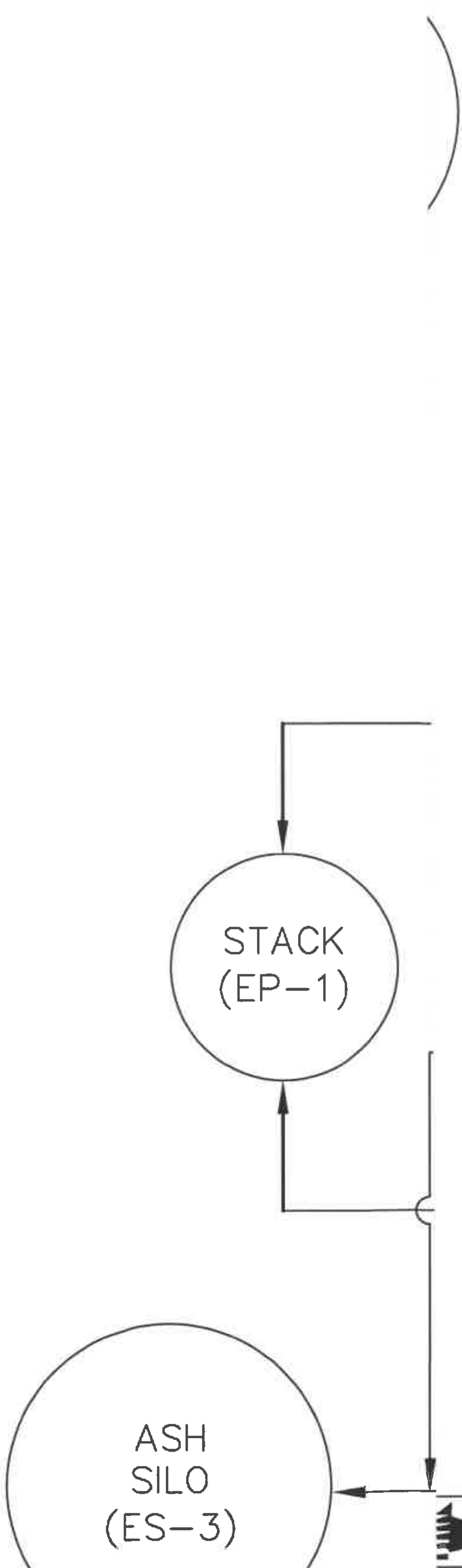
RATIONALE AND JUSTIFICATION:
A 3-hour block average was selected to be commensurate with the reference method test, which consists of three one-hour sampling events averaged.

ATTACHMENT A

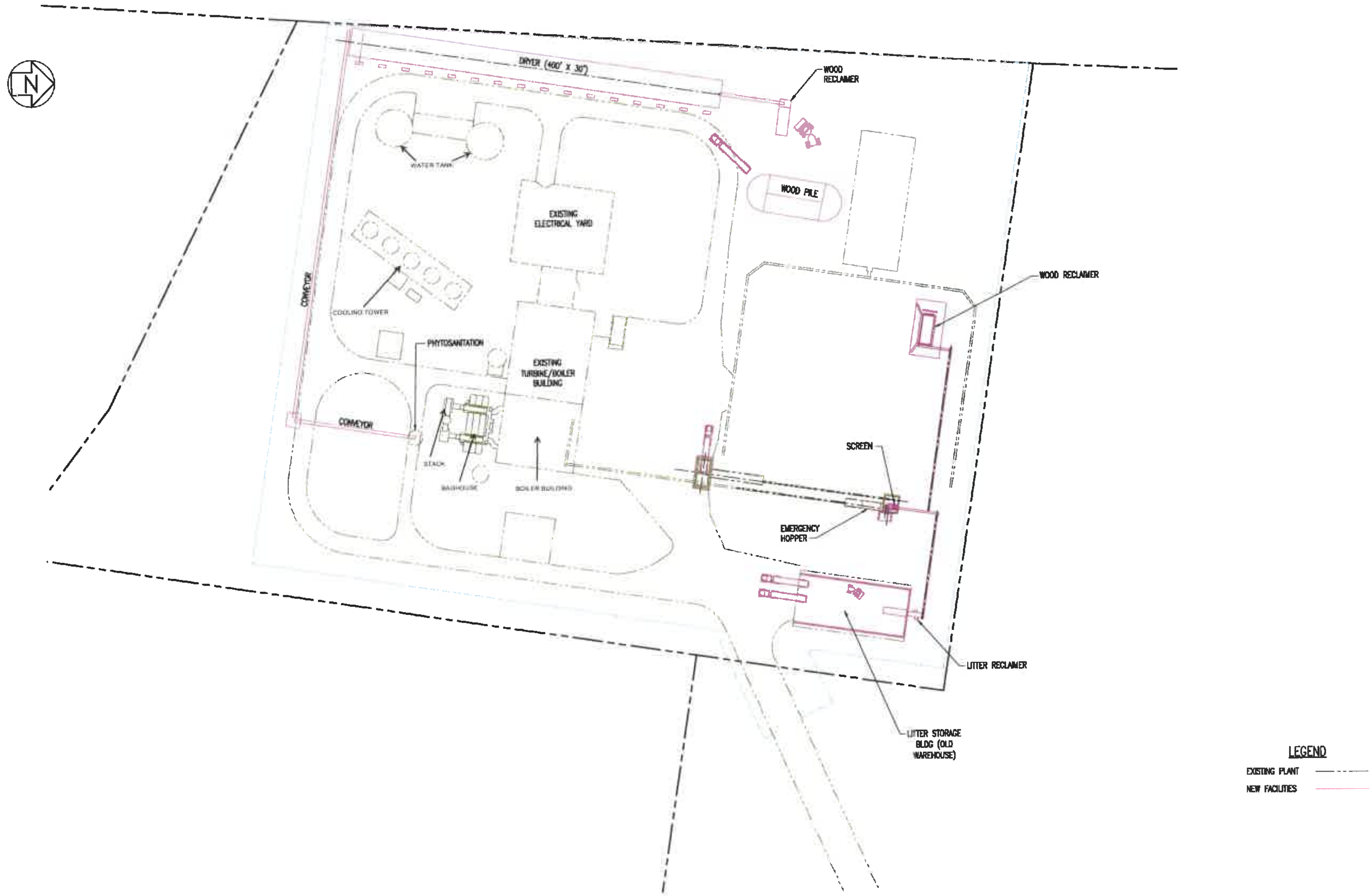
Figures

B.O.M.

SHOP MARK / SHIPPING MARK	PC	QUAN	DESCRIPTION	REMARKS



SCS	SCALE: NONE	DRAWN: G DAY	PROJ. NO.: 14072NC
	DATE: 3–5–15	CHK'D:	
...M & CONTROL ...STEMS, INC.	NORTH CAROLINA RENEWABLE POWER – LUMBERTON, LLC LUMBERTON, NC		
...O.BOX 23828 ...OGA, TN. 37422–3828	Process Flow Diagram		DWG. NO.: Figure 1
	HOLES:	PAINT:	



SITE PLAN

REV	DATE	BY	DESCRIPTION	CHK	ENGR	APPR	CLIENT
B	3/4/15	JDT	ISSUED FOR PERMIT				
A	2/2/15	JDT	PREHIMINARY				

IEC

PROJECT NO:	J15042
DESIGNED BY:	
DRAWN BY:	JDT
CHECKED BY:	
APPROVED BY:	
SCALE:	1"=50'
DATE	DEC/2014

GREENFUELS ENERGY, LLC

LUMBERTON POWER PLANT

LUMBERTON NORTH CAROLINA

FIGURE 2 - SITE PLAN

DRAWING NO: J15042-SK-009 REV: B

EPS
1050 Crown Pointe Pkwy
Suite: 550
Atlanta, GA 30338
404.315.9113

N

AIR PERMT APPLICATION

NORTH CAROLINA RENEWABLE POWER – LUMBERTON, LLC
1866 Hestertown Road
Lumberton, North Carolina 28359

SITE LOCATION MAP

FIGURE 3

APPENDIX B

Emissions Calculations

Table 4. Emission Rates for Modeling

Pollutant	Hourly Potential (lb/hr)												
	Boilers (ES-1A, ES-1B)	Starter Fuel (ES-1A, ES-1B)	Emergency Fire Pump (ES-1)	Fly Ash Silo (ES-3)	Drum Dryer (ES-22)	Parts Cleaner (IES-4)	Cooling Towers (IES-6)	Truck Dump 1 (IES-8)	Truck Dump 2 (IES-9)	Fuel Piles (IES-10)	Fuel Handling (IES-11)	Roads (IES-12)	Sorbent Silo (IES-13)
CO	193.50	15.36	1.95	-	2.77	-	-	-	-	-	-	-	-
NOx	68.80	73.71	2.25	-	3.29	-	-	-	-	-	-	-	-
SO2	68.80	0.65	0.70	-	0.04	-	-	-	-	-	-	-	-
PM	12.90	10.14	0.11	0.02	1.39	-	0.34	0.04	0.04	0.99	0.39	0.34	0.18
PM10	15.48	10.14	0.11	0.01	1.39	-	0.34	0.02	0.02	0.50	0.18	0.04	0.10
PM2.5	11.61	10.14	0.11	0.00	1.39	-	0.34	0.00	0.00	0.07	0.03	0.01	0.01

Emission Rate Increase (lb/hr)	
CO	192.19
NOx	52.77
SO2	29.78
VOC	12.76
PM	11.87
PM10	14.93
PM2.5	11.39

Table 7. Starter Fuel Potential Emissions Calculation
HAP/TAPs
For all pollutants listed below, emissions are based on AP-42 Chapter 1.3 (05/2010).

Pollutant	Emission Factor (lb/Mgal)	Convert[1] to lb/hr	Starter Fuel PTE[2] (tons/yr)	HAP or TAP?
Benzene	2.14E-04	6.57E-04	2.88E-04	HAP
Ethylbenzene	6.36E-05	1.95E-04	8.56E-05	HAP
Toluene	6.20E-03	1.90E-02	8.34E-03	HAP
Formaldehyde	3.30E-02	1.01E-01	4.44E-02	HAP
Naphthalene	1.13E-03	3.47E-03	1.52E-03	HAP
1,1,1-Trichloroethane	2.36E-04	7.25E-04	3.17E-04	HAP
Xylenes	1.09E-04	3.35E-04	1.47E-04	HAP
Acenaphthylene	2.53E-07	7.77E-07	3.40E-07	HAP
Acenaphthene	2.11E-05	6.48E-05	2.84E-05	HAP
Fluorene	4.47E-06	1.37E-05	6.01E-06	HAP
Phenanthrene	1.05E-05	3.23E-05	1.41E-05	HAP
Anthracene	1.22E-06	3.75E-06	1.64E-06	HAP
Fluoranthene	4.84E-06	1.49E-05	6.51E-06	HAP
Pyrene	4.25E-06	1.31E-05	5.72E-06	HAP
Benzo(a)anthracene	4.01E-06	1.23E-05	5.39E-06	HAP
Chrysene	2.38E-06	7.31E-06	3.20E-06	HAP
Benzo(b)fluoranthene	1.48E-06	4.55E-06	1.99E-06	HAP
Benzo(k)fluoranthene	1.48E-06	4.55E-06	1.99E-06	HAP
Indeno(1,2,3,c,d)pyrene	2.14E-06	6.57E-06	2.88E-06	HAP
Dibenzo(a,h)anthracene	1.67E-06	5.13E-06	2.25E-06	HAP
Benzo(g,h,i)perylene	2.26E-06	6.94E-06	3.04E-06	HAP
Octachlorodibenzo-p-dioxins	3.10E-09	9.52E-09	4.17E-09	HAP
Antimony	5.25E-03	1.61E-02	7.06E-03	HAP
Arsenic	1.32E-03	4.05E-03	1.78E-03	HAP
Barium	2.57E-03	7.89E-03	3.46E-03	TAP
Beryllium	2.78E-05	8.54E-05	3.74E-05	HAP
Cadmium	3.98E-04	1.22E-03	5.35E-04	HAP
Chromium (total)	1.09E-03	3.36E-03	1.47E-03	HAP
Cobalt	6.02E-03	1.85E-02	8.10E-03	HAP
Manganese	3.00E-03	9.21E-03	4.04E-03	HAP
Mercury	1.13E-04	3.47E-04	1.52E-04	HAP
Nickel	8.45E-02	2.60E-01	1.14E-01	HAP
Selenium	6.83E-04	2.10E-03	9.19E-04	HAP
Vanadium	3.18E-02	9.77E-02	4.28E-02	TAP
Lead	1.51E-03	4.64E-03	2.03E-03	HAP
Chloride	3.47E-01	1.07E+00	4.67E-01	TAP
Copper	1.76E-03	5.41E-03	2.37E-03	TAP
Flouride	3.73E-02	1.15E-01	5.02E-02	TAP
Phosphorus	9.46E-03	2.91E-02	1.27E-02	TAP
Zinc	2.91E-02	8.94E-02	3.91E-02	TAP

Notes:
1. To convert to lb/hr, the following equations are used (for example):
Benzene EF (lb/hr) = Benzene EF (lb/Mgal) x Boiler Max Heat Input (MMBtu/hr) ÷ Heat Content of No. 2 Fuel Oil (MMBtu/Mgal)
2. PTE is calculated as follows:
Benzene PTE (tons/yr) = Benzene EF (lb/Mgal) x No. 2 Fuel Oil Annual Usage Limit (Mgal/yr) ÷ 2,000 (lb/ton)

Table 1. PSD Applicability Analysis

PSD Applicability Analysis	Emissions (ton/yr)									
	CO	NOx	SO2	VOC	PM	PM10	PM2.5	Lead	H2SO4	CO2e
Baseline	5.75	70.20	170.90	0.60	4.50	2.40	0.95	0.00033	2.24	46,117
Future Potential	847.53	301.34	421.88	56.50	56.50	67.80	67.80	0.09	58.39	437,905
Emissions Increase	841.78	231.14	250.98	55.90	52.00	65.40	66.85	0.09	56.15	391,788
PSD Thresholds	**100**	**40**	**40**	**40**	**25**	**15**	**10**	**0.6**	**7**	**75,000**
Triggers PSD?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

Table 7. Starter Fuel Potential Emissions Calculation

No. 2 fuel oil will be used as starter fuel of the boiler.
The fuel oil usage will be limited to 10% of the annual capacity of the boiler (for avoidance of NOx limit under NSPS Db).

The fuel oil usage limit is calculated as follows:
Boiler Max Heat Input 430 MMBtu/hr
Max Annual Op Hrs = 8760 hr/yr

Boiler Annual Capacity = Boiler Max Heat Input (MMBtu/hr) x Max Annual Op Hrs (hr/yr)
Boiler Annual Capacity = 3,766,800 MMBtu/yr

10% of Boiler Annual Capacity = Boiler Annual Capacity x 10%
10% of Boiler Annual Capacity = 376,680 MMBtu/yr

No. 2 Fuel Oil Heat Content = 140.0 MMBtu/Mgal
No. 2 Fuel Oil Usage Limit = 10% of Boiler Annual Capacity / No. 2 Fuel Oil Heat Content
No. 2 Fuel Oil Usage Limit = 2,690.6 Mgal/yr (Per NSPS Db at 10% Boiler Annual Capacity)

Maximum Fuel Sulfur: 0.0015 S by weight (ULSD)

CRITERIA POLLUTANTS
For all pollutants listed below, emissions are based on AP-42 Chapter 1.3 (05/2010):

Pollutant	Emission Factor	Units	Convert to lb/hr[1]	Starter Fuel PTE[2] (tons/yr)
NOx	24.0	lb/Mgal	73.7	32.29
CO	5.0	lb/Mgal	15.4	6.73
PM (filterable+condensable)	3.3	lb/Mgal	10.1	4.44
SO_2	0.21	lb/Mgal	0.7	0.29
VOC	0.2	lb/Mgal	0.6	0.27

Table 8. Emergency Fire Pump Engine Potential Emissions Calculation

The emergency fire pump engine will be used for emergency fire purposes only.
Scheduled maintainence/testing will be limited to 9 hours per year (45 minutes/month).
Potential emissions are estimated based on maximum operation of 500 hours per year.

Engine Power in hp	340	hp
Fuel Type:	Diesel	
Maximum Fuel Sulfur:	0.0015%	S by weight
Max Operating Hours:	500	hr/yr

The engine meets NSPS Subpart IIII emissions standards for NOx/NMHC, CO, and PM (Model year 2009+).
For other pollutants, emissions are based on AP-42 Section 3.3 (10/96):

Pollutant	CAS	Emission Factor	Units	Convert to lb/hr	Fire Pump PTE (tons/yr)
NOx+NMHC		3.0	gr/hp-hr	2.2	0.56
CO		2.6	gr/hp-hr	1.9	0.49
PM		0.15	gr/hp-hr	0.1	0.03
SO_2		2.05E-03	lb/hp-hr	0.7	0.17
VOC		2.51E-03	lb/hp-hr	0.9	0.21
Benzene	71-43-2	9.33E-04	lb/MMBtu	2.22E-03	5.55E-04
Toluene	108-88-3	4.09E-04	lb/MMBtu	9.73E-04	2.43E-04
Xylenes	1330-20-7	2.85E-04	lb/MMBtu	6.78E-04	1.70E-04
Propylene	115-07-1	2.58E-03	lb/MMBtu	6.14E-03	1.54E-03
1,3 Butadiene	106-99-0	3.91E-05	lb/MMBtu	9.31E-05	2.33E-05
Formaldehyde	50-00-0	1.18E-03	lb/MMBtu	2.81E-03	7.02E-04
Acetaldehyde	75-07-0	7.67E-04	lb/MMBtu	1.83E-03	4.56E-04
Acrolein	107-02-8	9.25E-05	lb/MMBtu	2.20E-04	5.50E-05
Naphthalene	91-20-3	8.48E-05	lb/MMBtu	2.02E-04	5.05E-05
Acenaphthylene	POM	5.06E-06	lb/MMBtu	1.20E-05	3.01E-06
Acenaphthene	POM	1.42E-06	lb/MMBtu	3.38E-06	8.45E-07
Fluorene	POM	2.92E-05	lb/MMBtu	6.95E-05	1.74E-05
Phenanthrene	POM	2.94E-05	lb/MMBtu	7.00E-05	1.75E-05
Anthracene	POM	1.87E-06	lb/MMBtu	4.45E-06	1.11E-06
Fluoranthene	POM	7.61E-06	lb/MMBtu	1.81E-05	4.53E-06
Pyrene	POM	4.78E-06	lb/MMBtu	1.14E-05	2.84E-06
Benzo(a)anthracene	POM	1.68E-06	lb/MMBtu	4.00E-06	1.00E-06
Chrysene	POM	3.53E-07	lb/MMBtu	8.40E-07	2.10E-07
Benzo(b)fluoranthene	POM	9.91E-08	lb/MMBtu	2.36E-07	5.90E-08
Benzo(k)fluoranthene	POM	1.55E-07	lb/MMBtu	3.69E-07	9.22E-08
Benzo(a)pyrene	50-32-8	1.88E-07	lb/MMBtu	4.47E-07	1.12E-07
Indeno(1,2,3,c,d)pyrene	POM	3.75E-07	lb/MMBtu	8.93E-07	2.23E-07
Dibenzo(a,h)anthracene	POM	5.83E-07	lb/MMBtu	1.39E-06	3.47E-07
Benzo(g,h,i)perylene	POM	4.89E-07	lb/MMBtu	1.16E-06	2.91E-07

Notes:
1. PM_{10} and $PM_{2.5}$ are assumed to be equal to the NSPS PM emission rate.
2. To convert from lb/MMBtu to lb/hp-hr, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used.

Table 9. Fly Ash Silo Potential Emission Calculatioin

	Design Maximum Flow Rate (acfm)[1]	Outlet Particulate Grain Loading (grain/scf)	PM Emissions (lb/hr)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM Annual Emissions (tons/yr)	PM_{10} Annual Emissions (tons/yr)	$PM_{2.5}$ Annual Emissions (tons/yr)
ES-3 Fly Ash Silo	500.00	0.005	0.02	1.01E-02	1.01E-03	0.09	0.04	0.00

k Values	AP-42 Section 13.2.4 Aggregate Handling and Storage Piles, Aerodynamic Particle Size Multiplier for Equation 1
Total Suspended Particulate	0.74
PM10	0.35
PM2.5	0.035

[1]Volumetric flow through the dust collector (fabric filter).

[2]Lb/hr = [(scf/hr) * (grains/scf)] / (7000 grains/lb)

[3]Annual emissions (TPY) based on 8760 hours per year operation. TPY = (lb/hr) * (8760/2000)

[4]PM_{10} calculation uses particle size multiplier based on AP-42, Section 13.2.4; lb/hr (PM_{10}) = lb/hr (TSP) * (k PM_{10}/k TSP)

[5]$PM_{2.5}$ calculation uses particle size multiplier based on AP-42, Section 13.2.4; lb/hr ($PM_{2.5}$) = lb/hr (TSP) * (k $PM_{2.5}$/k TSP)

Table 10-1. Drum Dryer System Potential Emissions Calculation - Criteria Pollutants
Evaporation & Natural Gas Combustion

Emission factors for criteria pollutants from natural gas combustion and evaporation for the drum dryer equipped with low NOx burners are selected from EPA AP-42 Chapter 10.6.2 – Particleboard there is no value provided in that chapter.

Evaporation

Max. Annual Wood Capacity	289080	tons wood/yr	(33 tons/hr * 8760 hr/yr = 289,080 tons/yr)

Combustion

Total Dryer Burner Capacity	66.2	MMBtu/hr
Total RTO Capacity	1	MMBtu/hr
Total System Capacity	67.2	MMBtu/hr
Max. Operating Hours	8760	hr/yr
Natural Gas Heat Content	1020	Btu/scf

				UNCONTROLLED EMISSION RATES			CONTROLLED EMISSION RATES			
Pollutant Category	Pollutant	Emission Factors	Emission Factor Units	Emissions (lb/hr)	Emissions (tpy)	Control Efficiency[1,2,3]	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source[4]	Comment
Criteria Pollutant	CO	0.082	lb/MMBtu	5.53	24.24	50%	2.77	12.12	EPA AP-42 Chapter 1.4 – Natural Gas Combustion in Boilers	Used AP-42 Chapter 1.4 CO, NOx, and SO_2 emission factors; AP-42 Chapter 10.6.2 does not list emission factors for these pollutants.
Criteria Pollutant	NO_x	0.049	lb/MMBtu	3.29	14.43	0%	3.29	14.43	EPA AP-42 Chapter 1.4 – Natural Gas Combustion in Boilers	
Criteria Pollutant	SO_2	0.001	lb/MMBtu	0.04	0.17	0%	0.04	0.17	EPA AP-42 Chapter 1.4 – Natural Gas Combustion in Boilers	
Criteria Pollutant	VOC	2.0	lb/ODT	66.00	289.08	95%	3.30	14.45	EPA AP-42 Chapter 10.6.2 – Particleboard Manufacturing	Emission factors based on "Rotary dryer, direct natural gas-fired, softwood" in AP-42 Chapter 10.6.2
Criteria Pollutant	PM	0.42	lb/ODT	13.86	60.71	90%	1.39	6.07	EPA AP-42 Chapter 10.6.2 – Particleboard Manufacturing	
Criteria Pollutant	PM_{10}	0.42	lb/ODT	13.86	60.71	90%	1.39	6.07	EPA AP-42 Chapter 10.6.2 – Particleboard Manufacturing	
Criteria Pollutant	$PM_{2.5}$	0.42	lb/ODT	13.86	60.71	90%	1.39	6.07	EPA AP-42 Chapter 10.6.2 – Particleboard Manufacturing	

Notes:
1. Drum dryer VOC, PM, and CO emissions controlled by a multiclone and a 1 MMBtu/hr, natural gas-fired RTO.
2. RTO VOC control efficiency taken to be≥95% per https://www3.epa.gov/ttnchie1/mkb/documents/fregen.pdf. RTO CO control efficiency taken from vendor email
3. It is assumed that the combined control efficiency of the multiclone and RTO is 90% on PM, PM_{10}, and $PM_{2.5}$ emissions.
4. AP-42 emission factors are only provided for PM. Assumed filterable PM_{10} and $PM_{2.5}$ emission factors are the same as the filterable PM
5. CO, NO_x, SO_2 emissions due to evaporation are not determined in Chapter 10.6.2. Therefore, AP-42 Chapter 1.4 emission factors are used for these pollutants

Table 10-2. Drum Dryer System Potential Emissions Calculation - HAP
Combustion & Evaporation

Emission factors for hazardous air pollutants (HAPs) from combustion and evaporation in rotary dryers taken from AP-42 Chapter 10.6.2 - Particleboard otherwise taken from AP-42 Chapter 1.4

Evaporation

Max. Annual Wood Capacity	289080	tons wood/yr (33 tons/hr * 8760 hr/yr = 289,080 tons/yr)
Max. Operating Hours	8760	hr/yr

Combustion

Total Dryer Burner Capacity	66.2	MMBtu/hr
Total RTO Capacity	1	MMBtu/hr
Total System Capacity	67.2	MMBTU/hr (Burners and RTO)
Max. Operating Hours	8760	hr/yr
Natural Gas Heat Content	1020	Btu/scf

				UNCONTROLLED EMISSION RATES			CONTROLLED EMISSION RATES		
Pollutant Category	**Pollutant**	**CAS**	**Emission Factors (lb/ODT)**	**Emissions (lb/hr)**	**Emissions (tpy)**	**Control Efficiency[1]**	**Emissions (lb/hr)**	**Emissions (tpy)**	**Emission Factor Source**
HAP/TAP	Formaldehyde	50-00-0	0.01	0.28	1.24	95%	0.01	0.06	AP-42 Chapter 10.6.2
HAP	Methanol	67-56-1	0.07	2.41	10.55	95%	0.12	0.53	AP-42 Chapter 10.6.2
	Total HAP		0.08	2.69	11.79	95%	0.13	0.59	AP-42 Chapter 10.6.2

Table 10-2. Drum Dryer System Potential Emissions Calculation - HAP
Combustion & Evaporation

Emission factors for hazardous air pollutants (HAPs) from combustion and evaporation in rotary dryers taken from AP-42 Chapter 10.6.2 - Particleboard otherwise taken from AP-42 Chapter 1.4

				UNCONTROLLED EMISSION RATES			CONTROLLED EMISSION RATES		
Pollutant Category	Pollutant	CAS	Emission Factors (lb/MMBtu)	Emissions (lb/hr)	Emissions (tpy)	Control Efficiency[1]	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
HAP	Acenaphthene	POM	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP	Acenaphthylene	POM	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP	Anthracene	POM	2.35E-09	1.58E-07	6.93E-07	95%	7.91E-09	3.46E-08	AP-42 Chapter 1.4
HAP	Benz(a)anthracene	POM	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP/TAP	Benzene	71-43-2	2.06E-06	1.38E-04	6.06E-04	95%	6.92E-06	3.03E-05	AP-42 Chapter 1.4
HAP/TAP	Benzo(a)pyrene	50-32-8	1.18E-09	7.91E-08	3.46E-07	0%	7.91E-08	3.46E-07	AP-42 Chapter 1.4
HAP	Benzo(b)fluoranthene	POM	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP	Benzo(g,h,i)perylene	POM	1.18E-09	7.91E-08	3.46E-07	95%	3.95E-09	1.73E-08	AP-42 Chapter 1.4
HAP	Benzo(k)fluoranthene	POM	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP	Chrysene	POM	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP	Dibenzo(a,h)anthracene	POM	1.18E-09	7.91E-08	3.46E-07	95%	3.95E-09	1.73E-08	AP-42 Chapter 1.4
HAP	Dichlorobenzene	95-50-1	1.18E-06	7.91E-05	3.46E-04	95%	3.95E-06	1.73E-05	AP-42 Chapter 1.4
HAP	7,12- Dimethylbenz(a)anthracene	57-97-6	1.57E-08	1.05E-06	4.62E-06	95%	5.27E-08	2.31E-07	AP-42 Chapter 1.4
HAP	Fluoranthene	POM	2.94E-09	1.98E-07	8.66E-07	95%	9.88E-09	4.33E-08	AP-42 Chapter 1.4
HAP	Fluorene	POM	2.75E-09	1.84E-07	8.08E-07	95%	9.22E-09	4.04E-08	AP-42 Chapter 1.4
HAP	Formaldehyde	50-00-0	7.35E-05	Ap-42 Chater 10.6.2 emission factor used for formaldehyde					AP-42 Chapter 1.4
HAP/TAP	Hexane	110-54-3	1.76E-03	1.19E-01	5.19E-01	95%	5.93E-03	2.60E-02	AP-42 Chapter 1.4
HAP	Indeno(1,2,3-cd)pyrene	193-39-5	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP	3-Methylchloranthrene	56-49-5	1.76E-09	1.19E-07	5.19E-07	95%	5.93E-09	2.60E-08	AP-42 Chapter 1.4
HAP	2-Methylnaphthalene	POM	1.96E-08	1.32E-06	5.77E-06	95%	6.59E-08	2.89E-07	AP-42 Chapter 1.4

Table 10-2. Drum Dryer System Potential Emissions Calculation - HAP
Combustion & Evaporation

Emission factors for hazardous air pollutants (HAPs) from combustion and evaporation in rotary dryers taken from AP-42 Chapter 10.6.2 - Particleboard otherwise taken from AP-42 Chapter 1.4

				UNCONTROLLED EMISSION RATES			CONTROLLED EMISSION RATES		
Pollutant Category	Pollutant	CAS	Emission Factors (lb/MMBtu)	Emissions (lb/hr)	Emissions (tpy)	Control Efficiency[1]	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
HAP	Naphthalene	91-20-3	5.98E-07	4.02E-05	1.76E-04	95%	2.01E-06	8.80E-06	AP-42 Chapter 1.4
HAP	Phenanathrene	85-01-8	1.67E-08	1.12E-06	4.91E-06	95%	5.60E-08	2.45E-07	AP-42 Chapter 1.4
HAP	Pyrene	POM	4.90E-09	3.29E-07	1.44E-06	95%	1.65E-08	7.21E-08	AP-42 Chapter 1.4
HAP/TAP	Toluene	108-88-3	3.33E-06	2.24E-04	9.81E-04	95%	1.12E-05	4.91E-05	AP-42 Chapter 1.4
	Total HAP			0.119	0.522	95%	0.006	0.026	AP-42 Chapter 1.4
			Total HAP	**2.81**	**12.32**		**0.14**	**0.62**	AP-42 Chapter 1.4 & AP-42 Chapter 10.6.2

Notes:

1. RTO VOC control efficiency taken to be ≥95% per https://www3.epa.gov/ttnchie1/mkb/documents/fregen.pdf.

Table 11. Parts Cleaner (IES-4) Potential Emission Calculations

Calculation Parameters:

Dimensions:	2.5	ft	Estimated
	4	ft	Estimated
	10	ft2	Estimated
VOC Emission Factor[1]	0.08	lb/hr/ft2	
Hours of Operation	2000	hr/yr	(Estimated)

	VOC Emissions (lb/hr)	VOC Emissions (tons/yr)
IES-4 Solvent Parts Cleaner	0.80	0.80

Notes:
1. VOC emission factor (lb/hr/ft2) taken from AP-42, Vol. I, Ch 2.6: Solvent Degreasing, Table 4.6-2.
2. Annual Emissions (tons/yr) = x (lb/hr) * 2000 (hr/yr) / 2000 (lb/ton)

Table 12. Cooling Towers (IES-6) Potential Emission Calculations

Calculation Parameters:

Recirculation Rate	11,250	gal/min	(Estimated from rates for other power plants)
	675,000	gal/hr	
Drift	0.0006	%	(Estimated from rates for other power plants)
Density of Water	8.34	lb/gal	
TDS Concentration	10,000	ppm	(Estimated)

	PM Emissions (lb/hr)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM Annual Emissions (tons/yr)	PM_{10} Annual Emissions (tons/yr)	$PM_{2.5}$ Annual Emissions (tons/yr)
IES-6 Cooling Tower	3.38E-01	3.38E-01	3.38E-01	1.48	1.48	1.48

Notes:

1. Annual Emissions (tons/yr) = x (lb/hr) * 8760 (hr/yr) / 2000 (lb/ton)
2. Assume PM_{10} and $PM_{2.5}$ emissions are similar to PM emission estimates.

Table 13. Truck Dumps (IES-8 & -9) Potential Emission Calculations

0.74	PM K Value	AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles (January 1995)
0.35	PM_{10} K Value	AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles (January 1995)
0.053	$PM_{2.5}$ K Value	AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles (January 1995)
7.6	U - Average Wind Speed (mph)	National Climatic Data Center - average wind speed for Raleigh, NC
10	M - Wood Moisture Content (%)	Lowest estimated wood moisture content
96	Maximum Hourly Production Rate (tons/hr)	Estimate for Proposed Operational Parameters
445709	Maximum Annual Production Rate (TPY)	Estimate for Proposed Operational Parameters
		(Based on maximum hourly boiler firiing rates (42.4 tph) @ 8760 hours plus throughput needed to fill stockpiles

Emission Source ID No.	Source Description	Max Hourly Throughput (tons/hr)	Max Annual Throughput (TPY)	PM Emission Factor (lb/ton)[2]	PM_{10} Emission Factor (lb/ton)[2]	$PM_{2.5}$ Emission Factor (lb/ton)[2]	Hourly PM Emissions (lb/hr)[3]	Annual PM Emissions (TPY)[4]	Hourly PM_{10} Emissions (lb/hr)[3]	Annual PM_{10} Emissions (TPY)[4]	Hourly $PM_{2.5}$ Emissions (lb/hr)[3]	Annual $PM_{2.5}$ Emissions (TPY)[4]
IES-8	Truck Dumper No. 1	96	445709	0.000428766	0.000202795	3.07089E-05	0.041	0.096	0.019	0.045	0.003	0.007
IES-9	Truck Dumper No. 2	96	445709	0.000428766	0.000202795	3.07089E-05	0.041	0.096	0.019	0.045	0.003	0.007

Table 14. Fuel Piles (IES-10) Potential Emission Calculations

Emission Source ID No.	Emission Source Description	Pile Area (acres)	Pile Length (ft)	Pile Width (ft)	Height of Storage Pile (ft)	Pile Surface Area[1] (m^2)	PM (lb/hr)	PM (tpy)	PM_{10} (lb/hr)	PM_{10} (tpy)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (tpy)
EIS-10	Fuel Storage Pile (North Pile Area)	0.75	340	100	25	3926.48	0.496	2.17	0.248	1.09	0.037	0.16
EIS-10	Fuel Storage Pile (South Pile Area)	0.7	340	100	25	3926.48	0.496	2.17	0.248	1.09	0.037	0.16
						Total	**0.99**	**4.34**	**0.50**	**2.17**	**0.07**	**0.33**

Calculated Emission Factors[2,3]

PM (g/m2-day)	PM10 (g/m2-day)	PM2.5 (g/m2-day)
1.37	0.69	0.10

1. Surface area of piles calculated as half cylinders $S = 0.5 * 2\pi hL + 2\pi h^2$
   Where:
   h = the average of the pile height and 1/2 of the width
   b = 1/2 width
   c = height

As the two piles are connected at the center, the surface area of one half circle (the end of the half cylinder) has been subtracted from each.

2. EPA Report 451/R-93-001, "Models for Estimating Air Emissions Rates from Superfund Remedial Actions"

   EF = 1.9 x (s/15) x ((365-p)/235) x (f/15) (Equation 7-9)
   Where:
   EF = emission factor (g/m^2-day)
   p = number of days in a year with at least 0.254 mm (0.01 in) of precipitation
   p = 110 days per AP-42 Figure 13.2.2-1
   s = surface material silt content (%)
   s = 7.5 % per AP-42 Table 13.2.4-1; value for overburden
   f = fraction of time wind >5.4 m/s at mean pile height
   f = 20 per Table 7-3, Default Values for Estimating PM Emissions from Other Area Sources

3. PM Fractions (AP-42, Section 13.2.5-3)

Particle Size	k
PM30	1
PM10	0.5
PM2.5	0.075

Table 15. Material Handling - Transfer Operations (IES-11) Potential Emission Calculations

0.74 PM K Value	AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles (January 1995)
0.35 PM_{10} K Value	AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles (January 1995)
0.053 $PM_{2.5}$ K Value	AP-42, Section 13.2.4 - Aggregate Handling and Storage Piles (January 1995)
7.5 U - Average Wind Speed (mph)	National Climatic Data Center - average wind speed for Raleigh, NC
10 M - Wood Moisture Content (%)	Lowest estimated wood moisture content
44 Maximum Hourly Production Rate (tons/hr)	Estimate for Proposed Operational Parameters
385440 Maximum Annual Production Rate (TPY)	Estimate for Proposed Operational Parameters

Emission Source ID No.	Source Description	Max Hourly Throughput (tons/hr)	Max Annual Throughput (TPY)	PM Emission Factor (lb/ton)[1]	PM_{10} Emission Factor (lb/ton)[1]	$PM_{2.5}$ Emission Factor (lb/ton)[1,4]	Hourly PM Emissions (lb/hr)[2]	Annual PM Emissions (TPY)[3]	Hourly PM_{10} Emissions (lb/hr)[2]	Annual PM_{10} Emissions (TPY)[3]	Hourly $PM_{2.5}$ Emissions (lb/hr)[2]	Annual $PM_{2.5}$ Emissions (TPY)[3]
IES-11	Transfer Point - Truck Dumper Hopper to Screen Supply Conveyor	44.0	385440	4.21E-04	1.99E-04	2.95E-05	1.85E-02	8.12E-02	8.77E-03	3.84E-02	1.30E-03	5.69E-03
IES-11	Transfer Point - Screen Supply Conveyor to Disc Screen	44.0	385440	4.21E-04	1.99E-04	2.95E-05	1.85E-02	8.12E-02	8.77E-03	3.84E-02	1.30E-03	5.69E-03
IES-11	Transfer Point - Disc Screen to Screen Accepts Conveyor	44.0	385440	4.21E-04	1.99E-04	2.95E-05	1.85E-02	8.12E-02	8.77E-03	3.84E-02	1.30E-03	5.69E-03
IES-11	Transfer Point - Screen Accepts Conveyor to Wood Fuel Transfer Conveyor	44.0	385440	4.21E-04	1.99E-04	2.95E-05	1.85E-02	8.12E-02	8.77E-03	3.84E-02	1.30E-03	5.69E-03
IES-11	Transfer Point - Wood Fuel Transfer Conveyor to Storage Pile	44.0	385440	4.21E-04	1.99E-04	2.95E-05	1.85E-02	8.12E-02	8.77E-03	3.84E-02	1.30E-03	5.69E-03
IES-11	Transfer Point - Wood Fuel Transfer Conveyor to Top Distribution Conveyor	44.0	385440	4.21E-04	1.99E-04	2.95E-05	1.85E-02	8.12E-02	8.77E-03	3.84E-02	1.30E-03	5.69E-03
IES-11	Transfer Point - Top Distribution Conveyor to Reclaim Pile A1	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Top Distribution Conveyor to Reclaim Pile A2	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Top Distribution Conveyor to Reclaim Pile B1	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Top Distribution Conveyor to Reclaim Pile B2	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Reclaim Pile A1 to Boiler A Reclaim Slat No. 1	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Reclaim Pile A2 to Boiler A Reclaim Slat No. 2	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Reclaim Pile B1 to Boiler A Reclaim Slat No. 1	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Reclaim Pile B2 to Boiler A Reclaim Slat No. 2	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Reclaim Slat No. 1 to Boiler A Cross Chain Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Reclaim Slat No. 2 to Boiler A Cross Chain Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler B Reclaim Slat No. 1 to Boiler B Cross Chain Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler B Reclaim Slat No. 2 to Boiler B Cross Chain Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Cross Chain Conveyor to Secondary Screen A Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler B Cross Chain Conveyor to Secondary Screen B Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Secondary Screen A Feed Conveyor to Boiler A Secondary Screen	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Secondary Screen B Feed Conveyor to Boiler B Secondary Screen	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Secondary Screen A Feed Conveyor to Boiler A Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Secondary Screen B Feed Conveyor to Boiler B Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Overfeed Bucket Elevator to Boiler A Overfeed Return Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Overfeed Return Conveyor to Boiler A Bin Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Feed Conveyor to Boiler A Bin Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler B Overfeed Bucket Elevator to Boiler B Overfeed Return Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler B Overfeed Return Conveyor to Boiler B Bin Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler B Feed Conveyor to Boiler B Bin Feed Conveyor	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Bin Feed Conveyor to Fuel Bin 3A	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Bin Feed Conveyor to Fuel Bin 2A	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Bin Feed Conveyor to Fuel Bin 1A	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Bin Feed Conveyor to Fuel Bin 3B	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03

Table 15. Material Handling - Transfer Operations (IES-11) Potential Emission Calculations

IES-11	Transfer Point - Boiler A Bin Feed Conveyor to Fuel Bin 2B	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
IES-11	Transfer Point - Boiler A Bin Feed Conveyor to Fuel Bin 1B	22.0	192720	4.21E-04	1.99E-04	2.95E-05	9.27E-03	4.06E-02	4.39E-03	1.92E-02	6.49E-04	2.84E-03
						Total	**0.39**	**1.71**	**0.18**	**0.81**	**0.03**	**0.12**

[1] Emission factors calculated utilizing AP-42 Section 13.2.4 calculation: $EF = K*0.0032*(U/5)^{1.3}/(M/2)^{1.4}$

[2] Hourly emissions calculated utilizing maximum hourly throughput

[3] Annual emissions calculated utilizing maximum annual throughput

[4] $PM_{2.5}$ calculation uses particle size multiplier from AP-42 Section 13.2.4 (approximately 7% of PM is $PM_{2.5}$)

Table 15. Material Handling - Transfer Operations (IES-11) Potential Emission Calculations
Fuel Material Handling - Emission Estimates

Source ID NIES-11
Front-End Loader/Dozer Operations

Material Silt Content (s) [1]	1.6 %
Material Moisture Content (M)	10 %
Number of Dozers	1
Annual Operating Hours	8760
Particle size scaling factor, PM_{10}	0.75
Particle size scaling factor, $PM_{2.5}$	0.105

Emission Factor Equations[2]
PM (TSP $\leq$ 30 um) [3]
EF_{PM} (lb/hr/dozer) = $(5.7*(s)^{1.2})/(M)^{1.3}$

$\leq$ 15 um[4]
EF_{PM15} (lb/hr/dozer) = $(1.0*(s)^{1.5})/(M)^{1.4}$

Source ID No.	Source Description	Emission Factor, EF (lb/hr/dozer) PM	PM_{10}	$PM_{2.5}$	PM (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
IES-11	Front-End Loader/Dozer Operations	0.50	0.06	0.05	0.50	0.06	0.05	2.20	0.26	0.23

[1]Source: AP-42, Chapter 13.2.4 Aggregate Handling and Storage Piles, Table 13.2.4-1 (Crushed limestone)
[2]Source: AP-42, Chapter 11.9 Western Surface Coal Mining, Table 11.9-1 (bulldozing - overburden)
[3]Multiply the TSP predictive equation by the $PM_{2.5}$ scaling factor to determine the $PM_{2.5}$ emission factor
[4]Multiply the PM_{15} predictive equation by the PM_{10} scaling factor to determine the PM_{10} emission factor

Table 16. Roads (IES-12) Potential Emission Calculations

Traffic Details

	Average Weight (tons)	Number of Trucks per Year	Segments Traveled A	B	C
Chip Trucks	27.5	12,000	2	1	0
Cars	1	9,100	2	0	1

Segment	Paved/Unpaved	Length (miles)	VMT	Average Weight (tons)	Emission Factors (lb/VMT) PM	PM_{10}	$PM_{2.5}$	Emissions PM (lb/hr)	PM (tpy)	PM_{10} (lb/hr)	PM_{10} (tpy)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (tpy)
A	Paved	0.1	4,220	16.1	0.1174	0.0235	0.0058	0.06	0.23	0.01	0.05	0.003	0.01
B	Unpaved	0.5	6,000	27.5	0.4119	0.0467	0.0047	0.28	0.86	0.03	0.10	0.003	0.01
C	Paved	0.6	5,460	1	0.0069	0.0014	0.0003	0.004	0.02	0.001	0.003	0.0002	0.001
							Total:	0.34	1.11	0.04	0.15	0.01	0.02

1. Paved Roads (AP-42 Section 13.2.1)

Hourly Emissions

$E = k\,(sL)^{0.91}(W)^{1.02}$ (Equation 1)

where:

E = particulate emission factor (having units matching the units of k)

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

sL = road surface silt loading (grams per square meter - g/m^2)

sL = 0.6 for Ubiquitous Baseline ADT <500 (Table 13.2.1-3)

W = average weight (tons) of the vehicles traveling the road

Constants (AP-42, Section 13.2.1)

Particle Size	k (lb/VMT)
PM30	0.011
PM10	0.0022
PM2.5	0.00054

Annual Emissions

$E_{ext} = E\,(1-P/4N)$ (Equation 2)

where:

E_{ext} = annual emission factor (lb/VMT)

E = emission factor from Equation 1

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation

P = 110 days per Figure 13.2.2-1

N = number of hours in the averaging period

N = 365 days per year

2. Unpaved Roads (AP-42 Section 13.2.2)

Hourly Emissions

$E = k\,(s/12)^a(W/3)^b$ (Equation 1a)

where:

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

s = surface material silt content (%)

s = 8.4 % per AP-42 Table 13.2.2-1

W = mean vehicle weight (tons)

Constants (AP-42 Section 13.2.2, Table 13.2.2-2; values for industrial roads)

Particle Size	k (lb/VMT)	a	b
PM30	4.9	0.7	0.45
PM10	1.5	0.9	0.45
PM2.5	0.15	0.9	0.45

Annual Emissions

$E_{ext} = E\,[(365-P)/365]$ (Equation 2)

where:

E_{ext} = annual size-specific emission factor extrapolated for natural mitigation (lb/VMT)

E = emission factor from Equation 1a

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation

P = 110 days per Figure 13.2.2-1

Table 17. Sorbent Silo (IES-13) Potential Emission Calculations

AP-42 Section 11.26, Talc Processing

Summary of Particle Size Distributions for Talc Processing, Table 11.26-2 (Storage, bagging, air classification

PM10	0.568	Cumulative percent less than diameter
PM2.5	0.031	

Hourly Sorbent Throughput (lb/hr):	50,000
Annual Sorbent Througput (lb/year):	1314000
Annual Sorbent Througput (tons/year):	657

Total Suspended Particulate (TSP) Calculations

Source	Emission Factor[1] (lb/1,000 PM)	Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (tons/year)
Sorbent Silo	0.0036	0.18	4.7304	0.0023652

PM_{10} Calculations

Source	Emission Factor[1,2] (lb/ton)	Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (tons/year)
Sorbent Silo	2.04E-03	1.02E-01	2.69E+00	1.34E-03

$PM_{2.5}$ Calculations

Source	Emission Factor[1,2] (lb/ton)	Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (tons/year)
Sorbent Silo	1.12E-04	5.58E-03	1.47E-01	7.33E-05

[1]Table 11.26-1, Emission Factor for Talc Processing (Crushed talc storage bin loading, with fabric filter)

[2]PM_{10} and $PM_{2.5}$ emission factors calculated based on PM emission factor multiplied by the cumulative percent less than diameter

Table 2. Facility-Wide Potential Emissions (PTE) Summary

Pollutant	Hourly Potential (lb/hr)												
	Boilers (ES-1A, ES-1B)	Starter Fuel (ES-1A, ES-1B)	Emergency Fire Pump (ES-1)	Fly Ash Silo (ES-3)	Drum Dryer (ES-22)	Parts Cleaner (IES-4)	Cooling Towers (IES-6)	Truck Dump 1 (IES-8)	Truck Dump 2 (IES-9)	Fuel Piles (IES-10)	Fuel Handling (IES-11)	Roads (IES-12)	Sorbent Silo (IES-13)
CO	193.50	15.36	1.95	-	2.77	-	-	-	-	-	-	-	-
NOx	68.80	73.71	2.25	-	3.29	-	-	-	-	-	-	-	-
SO2	68.80	0.65	0.70	-	0.04	-	-	-	-	-	-	-	-
PM	12.90	10.14	0.11	0.02	1.39	-	0.34	0.04	0.04	0.99	0.39	0.34	0.18
PM10	15.48	10.14	0.11	0.01	1.39	-	0.34	0.02	0.02	0.50	0.18	0.04	0.10
PM2.5	11.61	10.14	0.11	0.00	1.39	-	0.34	0.00	0.00	0.07	0.03	0.01	0.01
VOC	12.90	0.61	0.21	-	3.30	0.80	-	-	-	-	-	-	-
Lead	2.06E-02	0.00	-	-	-	-	-	-	-	-	-	-	-
Highest Individual HAP (HCl)	2.71	-	-	-	-	-	-	-	-	-	-	-	-
Total HAP	4.20	0.45	0.00	-	0.14	-	-	-	-	-	-	-	-

Pollutant	Annual Potential Emissions (tons/year)													
	Boilers (ES-1A, ES-1B)	Starter Fuel (ES-1A, ES-1B)	Emergency Fire Pump (ES-1)	Fly Ash Silo (ES-3)	Drum Dryer (ES-22)	Parts Cleaner (IES-4)	Cooling Towers (IES-6)	Truck Dump 1 (IES-8)	Truck Dump 2 (IES-9)	Fuel Piles (IES-10)	Fuel Handling (IES-11)	Roads (IES-12)	Sorbent Silo (IES-13)	Facility-Wide
CO	847.53	6.73	0.49	-	12.12	-	-	-	-	-	-	-	-	866.86
NOx	301.34	32.29	0.56	-	14.43	-	-	-	-	-	-	-	-	348.62
SO2	301.34	0.29	0.17	-	0.17	-	-	-	-	-	-	-	-	301.98
PM	56.50	4.44	0.03	0.09	6.07	-	1.48	0.10	0.10	4.34	1.71	1.11	0.00	75.97
PM10	67.80	4.44	0.03	0.04	6.07	-	1.48	0.05	0.05	2.17	0.81	0.15	0.00	83.08
PM2.5	50.85	4.44	0.03	0.00	6.07	-	1.48	0.01	0.01	0.33	0.12	0.02	0.00	63.35
VOC	56.50	0.27	0.21	-	14.45	0.80	-	-	-	-	-	-	-	72.24
Lead	0.09	0.00	-	-	-	-	-	-	-	-	-	-	-	0.09
Highest Individual HAP (HCl)	11.87	-	-	-	-	-	-	-	-	-	-	-	-	11.87
Total HAP	18.41	0.19	0.00	-	0.62	-	-	-	-	-	-	-	-	19.22

Table 3. TPER Summary

		TPER Levels				Potential Emissions												Comparison of Emissions to TPER Levels			
						Potential Emissions from Boiler Burning 100% Biomass			Potential Emissions from Boiler Burning Litter/Wood Mix			Potential Emissions from Fire Pump			Potential Emissions from Facility-Wide						
Pollutant	CAS	Carcinogens lb/yr	Chronic Toxicants lb/day	Acute Systemic Toxicants lb/hr	Acute Irritants lb/hr	lb/yr	lb/day	lb/hr	lb/yr	lb/day	lb/hr	lb/yr	lb/day	lb/hr	lb/yr	lb/day	lb/hr	Carcinogens	Chronic Toxicants	Acute Systemic Toxicants	Acute Irritants
Acetaldehyde	75-07-0				28.43	306.24	0.84	0.03				0.91	0.04	0.002	307.15	0.88	0.04	N/A	N/A	N/A	No
Acetic Acid	64-19-7				3.9													N/A	N/A	N/A	No
Acrolein	107-02-8				0.08	561.25	1.54	0.06				0.11	0.005	2.20E-04	561.36	1.54	0.06	N/A	N/A	N/A	No
Acrylonitrile	107-13-1		1.3	1.05														N/A	No	No	N/A
Ammonia	7664-41-7				2.84	60268.80	165.12	6.88							60268.80	165.12	6.88	N/A	N/A	N/A	Yes
Aniline	62-53-3			1.05														N/A	N/A	No	N/A
Arsenic And Inorganic Arsenic Compounds	7440-38-2	0.194				82.87	0.23	0.009	90.12	0.25	0.01				90.12	0.25	0.01	Yes	N/A	N/A	N/A
Asbestos	1332-21-4	7.748 x 10-3																No	N/A	N/A	N/A
Aziridine	151-56-4		0.3															N/A	No	N/A	N/A
Benzene	71-43-2	11.069				247.86	0.68	0.03				1.11	0.05	0.002	248.97	0.73	0.03	Yes	N/A	N/A	N/A
Benzidine And Salts	92-87-5	1.384 x 10-3																No	N/A	N/A	N/A
Benzo(A)Pyrene	50-32-8	3.044				9.79	0.03	0.001				2.24E-04	1.07E-05	4.47E-07	9.79	0.03	0.001	Yes	N/A	N/A	N/A
Benzyl Chloride	100-44-7			0.53														N/A	N/A	No	N/A
Beryllium	7440-41-7	0.378				4.14	0.01	4.73E-04	3.24	0.009	3.70E-04				4.14	0.01	4.73E-04	Yes	N/A	N/A	N/A
Beryllium Chloride	7787-47-5	0.378																No	N/A	N/A	N/A
Beryllium Fluoride	7787-49-7	0.378																No	N/A	N/A	N/A
Beryllium Nitrate	13597-99-4	0.378																No	N/A	N/A	N/A
Bioavailable Chromate Pigments (As Cr6+)		0.008																No	N/A	N/A	N/A
Bis-Chloromethyl Ether	542-88-1	0.034																No	N/A	N/A	N/A
Bromine	7726-95-6				0.21													N/A	N/A	N/A	No
1,3-Butadiene	106-99-0	40.585										0.05	0.002	9.31E-05	0.05	0.002	9.31E-05	No	N/A	N/A	N/A
Cadmium	7440-43-9	0.507				15.44	0.04	0.002	8.59	0.02	9.80E-04				15.44	0.04	0.002	Yes	N/A	N/A	N/A
Cadmium Acetate	543-90-8	0.507																No	N/A	N/A	N/A
Cadmium Bromide	7789-42-6	0.507																No	N/A	N/A	N/A
Carbon Disulfide	75-15-0		7.8															N/A	No	N/A	N/A
Carbon Tetrachloride	56-23-5	618.006				169.51	0.46	0.02							169.51	0.46	0.02	No	N/A	N/A	N/A
Chlorine	7782-50-5		1.6		0.95	6780.24	18.58	0.77	356.43	0.98	0.04				6780.24	18.58	0.77	N/A	Yes	N/A	No
Chlorobenzene	108-90-7		92.7			124.30	0.34	0.01							124.30	0.34	0.01	N/A	No	N/A	N/A
Chloroform	67-66-3	396.631				105.47	0.29	0.01							105.47	0.29	0.01	No	N/A	N/A	N/A
Chloroprene	126-99-8		18.5	3.69														N/A	No	No	N/A
Cresol	1319-77-3			2.32														N/A	N/A	No	N/A
P-Dichlorobenzene	106-46-7				69.5													N/A	N/A	N/A	No
Dichlorodifluoromethane	75-71-8		10445.4															N/A	No	N/A	N/A
Dichlorofluoromethane	75-43-4		21.1															N/A	No	N/A	N/A
Di(2-Ethylhexyl)Phthalate	117-81-7		1.3			0.18	4.85E-04	2.02E-05							0.18	4.85E-04	2.02E-05	N/A	No	N/A	N/A
Dimethyl Sulfate	77-78-1		0.1															N/A	No	N/A	N/A
1,4-Dioxane	123-91-1		23.6															N/A	No	N/A	N/A
Epichlorohydrin	106-89-8	7655.891																No	N/A	N/A	N/A
Ethyl Acetate	141-78-6			147.41														N/A	N/A	No	N/A
Ethylenediamine	107-15-3		12.6	2.63														N/A	No	No	N/A
Ethylene Dibromide	106-93-4	36.896				207.17	0.57	0.02							207.17	0.57	0.02	Yes	N/A	N/A	N/A
Ethylene Dichloride	107-06-2	350.511				109.24	0.30	0.01							109.24	0.30	0.01	No	N/A	N/A	N/A
Ethylene Glycol Monoethyl Ether	110-80-5		5.1	2														N/A	No	No	N/A
Ethylene Oxide	75-21-8	2.49																No	N/A	N/A	N/A
Ethyl Mercaptan	75-08-1			0.11														N/A	N/A	No	N/A
Fluorides	7664-39-3		0.7	0.26														N/A	No	No	N/A
Formaldehyde	50-00-0				0.16	824.93	2.26	0.09				1.40	0.07	0.003	826.33	2.33	0.10	N/A	N/A	N/A	No
Hexachlorocyclopentadiene	77-47-4		2.5 x 10-2	0.01														N/A	No	No	N/A
Hexachlorodibenzo-P-Dioxin	57653- 85-7	0.007																No	N/A	N/A	N/A
N-Hexane	110-54-3		46.3															N/A	No	N/A	N/A

Table 3. TPER Summary

		TPER Levels				Potential Emissions												Comparison of Emissions to TPER Levels			
						Potential Emissions from Boiler Burning 100% Biomass			Potential Emissions from Boiler Burning Litter/Wood Mix			Potential Emissions from Fire Pump			Potential Emissions from Facility-Wide						
Pollutant	CAS	Carcinogens lb/yr	Chronic Toxicants lb/day	Acute Systemic Toxicants lb/hr	Acute Irritants lb/hr	lb/yr	lb/day	lb/hr	lb/yr	lb/day	lb/hr	lb/yr	lb/day	lb/hr	lb/yr	lb/day	lb/hr	Carcinogens	Chronic Toxicants	Acute Systemic Toxicants	Acute Irritants
Hexane Isomers Except N-Hexane					379.07													N/A	N/A	N/A	No
Hydrazine	302-01-2		2.5 x 10-2															N/A	No	N/A	N/A
Hydrogen Chloride	7647-01-0				0.74	23650.00	64.79	2.70	82869.60	227.04	9.46				82869.60	227.04	9.46	N/A	N/A	N/A	Yes
Hydrogen Cyanide	74-90-8		5.9	1.16														N/A	No	No	N/A
Hydrogen Fluoride	7664-39-3		1.3		0.26													N/A	No	N/A	No
Hydrogen Sulfide	7783-06-4		5.1															N/A	No	N/A	N/A
Maleic Anhydride	108-31-6		0.5	0.11														N/A	No	No	N/A
Manganese And Compounds	7439-96-5		1.3			43.69	0.12	0.005	285.55	0.78	0.03				285.55	0.78	0.03	N/A	No	N/A	N/A
Manganese Cyclopentadienyl Tricarbonyl	12079-65-1		2.5 x 10-2															N/A	No	N/A	N/A
Manganese Tetroxide	1317-35-7		0.3															N/A	No	N/A	N/A
Mercury, Alkyl	7439-97-6		2.5 x 10-3			13.18	0.04	0.002	4.17	0.01	4.76E-04				13.18	0.04	0.002	N/A	No	N/A	N/A
Mercury, Aryl And Inorganic Compounds	7439-97-6		2.5 x 10-2			13.18	0.04	0.002	4.17	0.01	4.76E-04				13.18	0.04	0.002	N/A	No	N/A	N/A
Mercury, Vapor	7439-97-6		2.5 x 10-2			13.18	0.04	0.002	4.17	0.01	4.76E-04				13.18	0.04	0.002	N/A	No	N/A	N/A
Methyl Chloroform	71-55-6		505.4		257.98	116.77	0.32	0.01							116.77	0.32	0.01	N/A	No	N/A	No
Methylene Chloride	75-09-2	2213.752		1.79		1092.37	2.99	0.12							1092.37	2.99	0.12	No	N/A	No	N/A
Methyl Ethyl Ketone	78-93-3		155.8		93.19	20.34	0.06	0.002							20.34	0.06	0.002	N/A	No	N/A	No
Methyl Isobutyl Ketone	108-10-1		107.8		31.59													N/A	No	N/A	No
Methyl Mercaptan	74-93-1			0.05														N/A	N/A	No	N/A
Nickel Carbonyl	13463-39-3		2.5 x 10-2															N/A	No	N/A	N/A
Nickel Metal	7440-02-0		0.3			124.30	0.34	0.01	64.00	0.18	0.007				124.30	0.34	0.01	N/A	Yes	N/A	N/A
Nickel, Soluble Compounds, As Nickel	7440-02-0		2.5 x 10-2			124.30	0.34	0.01	64.00	0.18	0.007				124.30	0.34	0.01	N/A	No	N/A	N/A
Nickel Subsulfide	12035-72-2	0.194																No	N/A	N/A	N/A
Nitric Acid	7697-37-2				1.05													N/A	N/A	N/A	No
Nitrobenzene	98-95-3		2.5	0.53														N/A	No	No	N/A
N-Nitrosodimethylamine	62-75-9	4.612																No	N/A	N/A	N/A
Non-Specific Chromium (Vi) Compounds (As Cr6+)	7440-47-3	0.008				79.10	0.22	0.009	43.34	0.12	0.005				79.10	0.22	0.009	Yes	N/A	N/A	N/A
Pentachlorophenol	87-86-5		0.1	0.03		0.19	5.26E-04	2.19E-05							0.19	5.26E-04	2.19E-05	N/A	No	No	N/A
Perchloroethylene	127-18-4	17525.534				143.14	0.39	0.02							143.14	0.39	0.02	No	N/A	N/A	N/A
Phenol	108-95-2			1		192.11	0.53	0.02							192.11	0.53	0.02	N/A	N/A	No	N/A
Phosgene	75-44-5		0.1															N/A	No	N/A	N/A
Phosphine	7803-51-2				0.14													N/A	N/A	N/A	No
Polychlorinated Biphenyls	1336-36- 3	7.656																No	N/A	N/A	N/A
Soluble Chromate Compounds (As Cr6+)			2.6 x 10-2															N/A	No	N/A	N/A
Styrene	100-42-5			11.16		174.78	0.48	0.02							174.78	0.48	0.02	N/A	N/A	No	N/A
Sulfuric Acid	7664-93-9		0.5	0.11		41434.80	113.52	4.73	116770.80	319.92	13.33				116770.80	319.92	13.33	N/A	Yes	Yes	N/A
Tetrachlorodibenzo-P-Dioxin	1746- 01-6	2.767 x 10-4																No	N/A	N/A	N/A
1,1,1,2-Tetrachloro-2,2,-Difluoroethane	76-11-9		2190.2															N/A	No	N/A	N/A
1,1,2,2-Tetrachloro-1,2-Difluoroethane	76-12-0		2190.2															N/A	No	N/A	N/A
1,1,2,2-Tetrachloroethane	79-34-5	581.11																No	N/A	N/A	N/A
Toluene	108-88-3		197.96		58.97	163.48	0.45	0.02				0.49	0.02	9.73E-04	163.97	0.47	0.02	N/A	No	N/A	No
Toluene Diisocyanate,2,4-(584-84-9) And 2,6- (91-08-7) Isomers	584-84-9		8.4 x 10-3															N/A	No	N/A	N/A
Toluene Diisocyanate,2,4-(584-84-9) And 2,6- (91-08-7) Isomers	91-08-7		8.4 x 10-3															N/A	No	N/A	N/A
Trichloroethylene	79-01-6	5442.14				113.00	0.31	0.01							113.00	0.31	0.01	No	N/A	N/A	N/A
Trichlorofluoromethane	75-69-4			589.66		154.44	0.42	0.02							154.44	0.42	0.02	N/A	N/A	No	N/A
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1				1000.32													N/A	N/A	N/A	No
Vinyl Chloride	75-01-4	35.051				67.80	0.19	0.008							67.80	0.19	0.008	Yes	N/A	N/A	N/A
Vinylidene Chloride	75-35-4		5.1															N/A	No	N/A	N/A
Xylene	1330-20-7		113.7		68.44	94.17	0.26	0.01				0.34	0.02	6.78E-04	94.51	0.27	0.01	N/A	No	N/A	No

Table 5. Boilers ES-1A & ES-1B Baseline Actual Emissions

	Annual Emissions (tpy)										24-Month Annualized Emissions (tpy)									
	CO	NOx	PM	PM10	PM2.5	SO2	VOC	Lead	H2SO4	CO2e	CO	NOx	PM	PM10	PM2.5	SO2	VOC	Lead	H2SO4	CO2e
2005	1.9	21.2	1.4	0.8	0.3	65.2	0.5	0.0001	0.75	15,239	-	-	-	-	-	-	-	-	-	-
2006	2.7	30.3	1.8	1.1	0.4	77.4	0.5	0.00015	1.03	21,655	2.30	25.75	1.60	0.95	0.35	71.30	0.50	0.00	0.89	18446.71
2007	6.1	82.1	4	2.4	1	164	0.6	0.00035	2.38	48,924	4.40	56.20	2.90	1.75	0.70	120.70	0.55	0.00	1.71	35,289
2008	5.4	58.3	3.5	2.1	0.9	177.8	0.6	0.0003	2.09	43,310	5.75	70.20	3.75	2.25	0.95	170.90	0.60	0.00	2.24	46,117
2009	1.3	13.2	5.5	2.7	0.7	40.7	0.3	0.00005	0.49	10,426	3.35	35.75	4.50	2.40	0.80	109.25	0.45	0.00	1.29	26,868
2010	0	0.1	0	0	0	0	0.3	0	0	1.9	0.65	6.65	2.75	1.35	0.35	20.35	0.30	0.00	0.25	5,214
2011	0	0.1	0	0	0	0	0.3	0	0	1.9	0.00	0.10	0.00	0.00	0.00	0.00	0.30	0.00	0.00	1.90
2012	0	0.1	0	0	0	0	0.3	0	0	1.8	0.00	0.10	0.00	0.00	0.00	0.00	0.30	0.00	0.00	1.85
2013	0	0	0	0	0	0	0.3	0	0	0	0.00	0.05	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.90
2014	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00
										Baseline Actual Emissions (tpy):	**5.75**	**70.20**	**4.50**	**2.40**	**0.95**	**170.90**	**0.60**	**0.00**	**2.24**	**46,117**
										Baseline Period:	2007/2008	2007/2008	2008/2009	2008/2009	2007/2008	2007/2008	2007/2008	2007/2008	2007/2008	2007/2008

Notes:

1. Baseline Emissions are based on NCDAQ Emission Reports, except CO2e. CO2e baseline determined from 2009 reported emissions, using ratio of CO emissions.
2. The facility did not operate 2010 through 2014.

Table 6-1. Boiler Potential Emissions Calculation - Criteria Pollutants

Input Capacity per Boiler:	215 MMBtu/hr
Number of Boilers:	2
Total Boiler Capacity:	430 MMBtu/hr
Max Annual Operation:	8,760 hours

Wood/Litter Mix Combustion (Expected mix: 15% wood, 85% litter)

		PRE-CONTROL EMISSION RATES						POST-CONTROL EMISSION RATES			
Pollutant Category	Pollutant	(lb/MMBtu)	(lb/hr)	(tpy)	Pre-Control Emission Factor Source	Control	Control Efficiency	(lb/MMBtu)	(lb/hr)	(tpy)	Comments
Criteria Pollutant	CO	0.45	193.50	847.5	Same as post-control emissions	Good Combustion	N/A	0.45	193.50	847.5	Based on BACT CO limit of 0.45 lb/MMBtu (when burning wood/litter mix)
Criteria Pollutant	NOx	0.21	89.58	392.4	Back calculated from post-combustion lb/MMBtu emission factor and control efficieny	SNCR	40%	0.125	53.75	235.4	Based on proposed SB3 BACT NOx limit of 0.16 lb/MMBtu (when burning wood/litter mix)
Criteria Pollutant	SO_2	0.80	344.00	1,506.7	Estimated using typical sulfur contents of wood and litter, and assuming 50% furnace capture.	Low Sulfur Wood/ Litter Mix	80%	0.16	68.80	301.3	Based on BACT SO2 limit of 80% Reduction (when burning wood/litter mix). Also limited by modeling.
Criteria Pollutant	VOC	0.03	12.90	56.5	Same as post-control emissions	Good Combustion	N/A	0.03	12.90	56.5	No change is requested to the existing SB3 BACT VOC limit
Criteria Pollutant	PM (filterable)	0.60	258.00	1,130.0	Back calculated from post-combustion lb/MMBtu emission factor and control efficieny	Cyclone + Baghouse	95%	0.03	12.90	56.5	Based on NSPS PM limit of 0.03 lb/MMBtu
Criteria Pollutant	PM_{10} (filterable + condensable)	0.72	309.60	1,356.0		Cyclone + Baghouse	95%	0.036	15.48	67.8	Based on BACT limit and vendor guarantee
Criteria Pollutant	$PM_{2.5}$ (filterable + condensable)	0.54	232.20	1,017.0		Cyclone + Baghouse	95%	0.027	11.61	50.9	Proposed new BACT limit. Also, limited by modeling.
Greenhouse Gas Pollutant	CO2e	233.00	100,188	438,825	Same as post-control emissions	Good Combustion	N/A	233.00	100,188	438,825	Factors from EPA Greenhouse Gas Mandatory Reporting Rule, Tables C-1 and C-2. See Notes 1 and 2.

Notes:

1. Fuel oil usage has been excluded from the GHG emission calculation as the factors for each pollutant are lower than the factors for wood and litter.
2. Greenhouse gas emissions were calculated using the following emission factors from EPA's Mandatory Reporting Rule, Tables C-1 and C-2:

Wood ("Biomass Fuels - solid: wood and wood residuals")

CO_2	93.80 kg/MMBtu
CH_4	7.2E-03 kg/MMBtu
N_2O	3.6E-03 kg/MMBtu

Litter ("Biomass fuels - solid: solid byproducts")

CO_2	105.51 kg/MMBtu
CH_4	3.2E-02 kg/MMBtu
N_2O	4.2E-03 kg/MMBtu

The factors above were converted to CO_2e using the following global warming potentials from Table A-1 of the MRR:

CO_2	1
CH_4	25
N_2O	298

The developed factor is converted from kg to lb and weighted based on 15% wood and 85% litter being fired in the boiler.

Table 6-2. Emission Factors of HAPs and Air Toxics From Wood and Litter Combustion

Wood Combustion

Emission factors HAPs and Air Toxics from wood biomass combustion in the boiler are selected from the following sources, in order of hierarchy:

1. Boiler and air pollution control device (APCD) vendor guarantees for HCl and NH3.
2. EPA AP-42 Chapter 1.6 – Wood Residue Combustion in Boilers (9/03)
3. May 2010 Emission test data for Coastal Carolina Clean Power, LLC's Kenansville, NC Facility (CCCP Kenansville) for chlorine, manganese, formaldehyde, acetaldehyde, acrolein, styrene, benzene, and toluene. CCCP

Poultry Litter and Wood Biomass Combined

Emission factors from Coastal Carolina Clean Power, LLC (Kenansville, NC). Test runs from May 2013, July 2013, and July 2014.

							Poultry Litter + Biomass Combustion															
							CC May 2013 (ES-1A)			CC July 2013 (ES-1B)			CC July 2014 (ES-1B)									
				Poultry Litter (including bedding)%			67%			Not specified			25%									
				Biomass%			33%			Not specified			75%									
				Heat Input Rate During Tests			186	MMBtu/hr		183	MMBtu/hr		180	MMBtu/hr								
			100% Wood Biomass Combustion				Stack Test Emission Factors									Maximum Emissions from Poultry Litter + Biomass Combustion				Potential Emissions		
Pollutant Category	Pollutant	CAS	Emission Factors (lb/MMBtu)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)	lb/MMBtu	lb/hr	Final lb/MMBtu	lb/MMBtu	lb/hr	Final lb/MMBtu	lb/MMBtu	lb/hr	Final lb/MMBtu	Litter/Wood Mix Emission Factor Used in Calcs (lb/MMBtu)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)
HAP	HCl	7647-01-0	0.0063	Vendor Guarantee. Use of low chlorine content wood.	2.71E+00	11.87	Not used. NESHAP limit used instead.									0.0063	MACT avoidance	2.71	11.87	Poultry Litter + Biomass	2.71	11.87
VHAP	Acetaldehyde	75-07-0	8.13E-05	CCCP Kenansville May 2010 Test Data	3.50E-02	0.15														Biomass	3.50E-02	0.15
VHAP	Acetophenone		3.20E-09	AP-42 Chapter 1.6	1.38E-06	6.03E-06														Biomass	1.38E-06	6.03E-06
VHAP	Acrolein	107-02-8	1.49E-04	CCCP Kenansville May 2010 Test Data	6.41E-02	0.28														Biomass	6.41E-02	0.28
VHAP	Benzene	71-43-2	6.58E-05	CCCP Kenansville May 2010 Test Data	2.83E-02	0.12														Biomass	2.83E-02	0.12
VHAP	bis(2-Ethylhexyl)phthalate	117-81-7	4.70E-08	AP-42 Chapter 1.6	2.02E-05	8.85E-05														Biomass	2.02E-05	8.85E-05
VHAP	Bromomethane	74-83-9	1.50E-05	AP-42 Chapter 1.6	6.45E-03	0.03														Biomass	6.45E-03	0.03
VHAP	Carbon Tetrachloride	56-23-5	4.50E-05	AP-42 Chapter 1.6	1.94E-02	0.08														Biomass	1.94E-02	0.08
VHAP	Chlorine	7782-50-5	0.0018	CCCP Kenansville May 2010 Test Data	7.74E-01	3.39		0.0176	9.46E-05		0.0135	7.38E-05		0.00987	5.48E-05	0.0001	Max emission rate from CC stack tests.[1]	0.04	0.18	Biomass	7.74E-01	3.39
VHAP	Chlorobenzene	108-90-7	3.30E-05	AP-42 Chapter 1.6	1.42E-02	0.06														Biomass	1.42E-02	0.06
VHAP	Chloroform	67-66-3	2.80E-05	AP-42 Chapter 1.6	1.20E-02	0.05														Biomass	1.20E-02	0.05
VHAP	Chloromethane	74-87-3	2.30E-05	AP-42 Chapter 1.6	9.89E-03	0.04														Biomass	9.89E-03	0.04
VHAP	Cumene	98-82-8	N/A	AP-42 Chapter 1.6																		
VHAP	Di-n-butylphthalate	84-74-2	N/A	AP-42 Chapter 1.6																		
VHAP	2,4-Dinitrophenol	51-28-5	1.80E-07	AP-42 Chapter 1.6	7.74E-05	3.39E-04														Biomass	7.74E-05	3.39E-04
VHAP	2,4-Dinitrotoluene	121-14-2	N/A	AP-42 Chapter 1.6																		
VHAP	1,4-Dichlorobenzene	106-46-7	N/A	AP-42 Chapter 1.6																		
VHAP	1,2-Dichloroethane	107-06-2	2.90E-05	AP-42 Chapter 1.6	1.25E-02	0.05														Biomass	1.25E-02	0.05
VHAP	1,2-Dichloropropane	78-87-5	3.30E-05	AP-42 Chapter 1.6	1.42E-02	0.06														Biomass	1.42E-02	0.06
VHAP	Ethylbenzene	100-41-4	3.10E-05	AP-42 Chapter 1.6	1.33E-02	0.06														Biomass	1.33E-02	0.06
VHAP	Formaldehyde	50-00-0	2.19E-04	CCCP Kenansville May 2010 Test Data	9.42E-02	0.41														Biomass	9.42E-02	0.41
VHAP	n-Hexane	110-54-3	N/A	AP-42 Chapter 1.6																		
VHAP	Methanol	67-56-1	N/A	AP-42 Chapter 1.6																		
VHAP	Methyl Isobutyl Ketone	108-10-1	N/A	AP-42 Chapter 1.6																		
VHAP	Methylene Chloride	75-09-2	2.90E-04	AP-42 Chapter 1.6	1.25E-01	0.55														Biomass	1.25E-01	0.55
VHAP	Naphthalene	91-20-3	9.70E-05	AP-42 Chapter 1.6	4.17E-02	0.18														Biomass	4.17E-02	0.18
VHAP	4-Nitrophenol	100-02-7	1.10E-07	AP-42 Chapter 1.6	4.73E-05	2.07E-04														Biomass	4.73E-05	2.07E-04
VHAP	Pentachlorophenol	87-86-5	5.10E-08	AP-42 Chapter 1.6	2.19E-05	9.61E-05														Biomass	2.19E-05	9.61E-05
VHAP	Phenol	108-95-2	5.10E-05	AP-42 Chapter 1.6	2.19E-02	0.10														Biomass	2.19E-02	0.10
VHAP	Propionaldehyde	123-38-6	6.10E-05	AP-42 Chapter 1.6	2.62E-02	0.11														Biomass	2.62E-02	0.11
VHAP	Styrene	100-42-5	4.64E-05	CCCP Kenansville May 2010 Test Data	2.00E-02	0.09														Biomass	2.00E-02	0.09
VHAP	Toluene	108-88-3	4.34E-05	CCCP Kenansville May 2010 Test Data	1.87E-02	0.08														Biomass	1.87E-02	0.08
VHAP	Tetrachloroethene	127-18-4	3.80E-05	AP-42 Chapter 1.6	1.63E-02	0.07														Biomass	1.63E-02	0.07
VHAP	1,1,1-Trichloroethane	71-55-6	3.10E-05	AP-42 Chapter 1.6	1.33E-02	0.06														Biomass	1.33E-02	0.06
VHAP	Trichloroethylene	79-01-6	3.00E-05	AP-42 Chapter 1.6	1.29E-02	0.06														Biomass	1.29E-02	0.06
VHAP	2,4,6-Trichlorophenol	88-06-2	2.20E-08	AP-42 Chapter 1.6	9.46E-06	4.14E-05														Biomass	9.46E-06	4.14E-05
VHAP	Vinyl Chloride	75-01-4	1.80E-05	AP-42 Chapter 1.6	7.74E-03	0.03														Biomass	7.74E-03	0.03
VHAP	Xylenes	1330-20-7	2.50E-05	AP-42 Chapter 1.6	1.08E-02	0.05														Biomass	1.08E-02	0.05
VHAP	HF	7664-39-3	N/A	AP-42 Chapter 1.6																		
Metal HAP	Antimony	7440-36-0	7.90E-06	AP-42 Chapter 1.6	3.40E-03	0.01														Biomass	3.40E-03	0.01

Table 6-2. Emission Factors of HAPs and Air Toxics From Wood and Litter Combustion

Wood Combustion

Emission factors HAPs and Air Toxics from wood biomass combustion in the boiler are selected from the following sources, in order of hierarchy:

1. Boiler and air pollution control device (APCD) vendor guarantees for HCl and NH3.
2. EPA AP-42 Chapter 1.6 – Wood Residue Combustion in Boilers (9/03)
3. May 2010 Emission test data for Coastal Carolina Clean Power, LLC's Kenansville, NC Facility (CCCP Kenansville) for chlorine, manganese, formaldehyde, acetaldehyde, acrolein, styrene, benzene, and toluene. CCCP

Poultry Litter and Wood Biomass Combined

Emission factors from Coastal Carolina Clean Power, LLC (Kenansville, NC). Test runs from May 2013, July 2013, and July 2014.

							Poultry Litter + Biomass Combustion															
							CC May 2013 (ES-1A)			CC July 2013 (ES-1B)			CC July 2014 (ES-1B)									
						Poultry Litter (including bedding)%	67%			Not specified			25%									
						Biomass%	33%			Not specified			75%									
						Heat Input Rate During Tests	186	MMBtu/hr		183	MMBtu/hr		180	MMBtu/hr								
			100% Wood Biomass Combustion				Stack Test Emission Factors									Maximum Emissions from Poultry Litter + Biomass Combustion				Potential Emissions		
Pollutant Category	**Pollutant**	**CAS**	**Emission Factors (lb/MMBtu)**	**Emission Factor Source**	**Emissions (lb/hr)**	**Emissions (tpy)**	**lb/MMBtu**	**lb/hr**	**Final lb/MMBtu**	**lb/MMBtu**	**lb/hr**	**Final lb/MMBtu**	**lb/MMBtu**	**lb/hr**	**Final lb/MMBtu**	**Litter/Wood Mix Emission Factor Used in Calcs (lb/MMBtu)**	**Emission Factor Source**	**Emissions (lb/hr)**	**Emissions (tpy)**	**Emission Factor Source**	**Emissions (lb/hr)**	**Emissions (tpy)**
Metal HAP	Arsenic	7440-38-2	2.20E-05	AP-42 Chapter 1.6	9.46E-03	0.04		4.45E-03	2.39E-05							2.39E-05	Max emission rate from CC stack tests.	0.01	0.05	Poultry Litter + Biomass	1.03E-02	0.05
Metal HAP	Beryllium	7440-41-7	1.10E-06	AP-42 Chapter 1.6	4.73E-04	0.002		1.60E-04	8.60E-07							8.60E-07	Max emission rate from CC stack tests.	0.00	0.00	Biomass	4.73E-04	0.002
Metal HAP	Cadmium	7440-43-9	4.10E-06	AP-42 Chapter 1.6	1.76E-03	0.008		4.24E-04	2.28E-06							2.28E-06	Max emission rate from CC stack tests.	0.00	0.00	Biomass	1.76E-03	0.008
Metal HAP	Chromium (Total)	7440-47-3	2.10E-05	AP-42 Chapter 1.6	9.03E-03	0.04		2.14E-03	1.15E-05							1.15E-05	Max emission rate from CC stack tests.	0.00	0.02	Biomass	9.03E-03	0.04
Metal HAP	Cobalt	7440-48-4	6.50E-06	AP-42 Chapter 1.6	2.80E-03	0.01														Biomass	2.80E-03	0.01
Metal HAP	Lead	7439-92-1	4.80E-05	AP-42 Chapter 1.6	2.06E-02	0.09	2.86E-05	5.32E-03	2.86E-05							2.86E-05	Max emission rate from CC stack tests.	0.01	0.05	Biomass	2.06E-02	0.09
Metal HAP	Manganese	7439-96-5	1.16E-05	CCCP Kenansville May 2010 Test Data	4.99E-03	0.02		1.41E-02	7.58E-05							7.58E-05	Max emission rate from CC stack tests.	0.03	0.14	Poultry Litter + Biomass	3.26E-02	0.14
Metal HAP	Mercury	7439-97-6	3.50E-06	AP-42 Chapter 1.6	1.51E-03	0.007		2.06E-04	1.11E-06							1.11E-06	Max emission rate from CC stack tests.	0.00	0.00	Biomass	1.51E-03	0.007
Metal HAP	Nickel	7440-02-0	3.30E-05	AP-42 Chapter 1.6	1.42E-02	0.06		3.16E-03	1.70E-05							1.70E-05	Max emission rate from CC stack tests.	0.01	0.03	Biomass	1.42E-02	0.06
Metal HAP	Selenium	7782-49-2	2.80E-06	AP-42 Chapter 1.6	1.20E-03	0.005	2.41E-07	2.15E-03	2.41E-07							2.41E-07	Max emission rate from CC stack tests.	0.00	0.00	Biomass	1.20E-03	0.005
POM	Acenaphthene	POM	9.10E-07	AP-42 Chapter 1.6	3.91E-04	0.002														Biomass	3.91E-04	0.002
POM	Acenaphthylene	POM	5.00E-06	AP-42 Chapter 1.6	2.15E-03	0.009														Biomass	2.15E-03	0.009
POM	Anthracene	POM	3.00E-06	AP-42 Chapter 1.6	1.29E-03	0.006														Biomass	1.29E-03	0.006
POM	Benzo(a)anthracene	POM	6.50E-08	AP-42 Chapter 1.6	2.80E-05	1.22E-04														Biomass	2.80E-05	1.22E-04
POM	Benzo(a)pyrene	50-32-8	2.60E-06	AP-42 Chapter 1.6	1.12E-03	0.005														Biomass	1.12E-03	0.005
POM	Benzo(b)fluoranthene	POM	1.00E-07	AP-42 Chapter 1.6	4.30E-05	1.88E-04														Biomass	4.30E-05	1.88E-04
POM	Benzo(e)pyrene	POM	2.60E-09	AP-42 Chapter 1.6	1.12E-06	4.90E-06														Biomass	1.12E-06	4.90E-06
POM	Benzo(g,h,i)perylene	POM	9.30E-08	AP-42 Chapter 1.6	4.00E-05	1.75E-04														Biomass	4.00E-05	1.75E-04
POM	Benzo(j,k)fluoranthene	POM	1.60E-07	AP-42 Chapter 1.6	6.88E-05	3.01E-04														Biomass	6.88E-05	3.01E-04
POM	Benzo(k)fluoranthene	POM	3.60E-08	AP-42 Chapter 1.6	1.55E-05	6.78E-05														Biomass	1.55E-05	6.78E-05
POM	2-Chloronaphthalene	POM	2.40E-09	AP-42 Chapter 1.6	1.03E-06	4.52E-06														Biomass	1.03E-06	4.52E-06
POM	Chrysene	POM	3.80E-08	AP-42 Chapter 1.6	1.63E-05	7.16E-05														Biomass	1.63E-05	7.16E-05
POM	Dibenzo(a,h)anthracene	POM	9.10E-09	AP-42 Chapter 1.6	3.91E-06	1.71E-05														Biomass	3.91E-06	1.71E-05
POM	Fluoranthene	POM	1.60E-06	AP-42 Chapter 1.6	6.88E-04	0.003														Biomass	6.88E-04	0.003
POM	Fluorene	POM	3.40E-06	AP-42 Chapter 1.6	1.46E-03	0.006														Biomass	1.46E-03	0.006
POM	Indeno(1,2,3,c,d)pyrene	POM	8.70E-08	AP-42 Chapter 1.6	3.74E-05	1.64E-04														Biomass	3.74E-05	1.64E-04
POM	Monochlorobiphenyl	POM	2.20E-10	AP-42 Chapter 1.6	9.46E-08	4.14E-07														Biomass	9.46E-08	4.14E-07
POM	2-Methylnaphthalene	POM	1.60E-07	AP-42 Chapter 1.6	6.88E-05	3.01E-04														Biomass	6.88E-05	3.01E-04
POM	Phenanthrene	POM	7.00E-06	AP-42 Chapter 1.6	3.01E-03	0.01														Biomass	3.01E-03	0.01
POM	Pyrene	POM	3.70E-06	AP-42 Chapter 1.6	1.59E-03	0.007														Biomass	1.59E-03	0.007
POM	Perylene	POM	5.20E-10	AP-42 Chapter 1.6	2.24E-07	9.79E-07														Biomass	2.24E-07	9.79E-07
Total PAH (POM)	Total PAH (POM)	TotalPAH(POM)	2.80E-05	AP-42 Chapter 1.6	1.20E-02	0.05														Biomass	1.20E-02	0.05
DBF	Heptachlorodibenzo-p-furans	DBF	2.40E-10	AP-42 Chapter 1.6	1.03E-07	4.52E-07														Biomass	1.03E-07	4.52E-07
DBF	Hexachlorodibenzo-p-furans	DBF	2.80E-10	AP-42 Chapter 1.6	1.20E-07	5.27E-07														Biomass	1.20E-07	5.27E-07
DBF	Octachlorodibenzo-p-furans	DBF	8.80E-11	AP-42 Chapter 1.6	3.78E-08	1.66E-07														Biomass	3.78E-08	1.66E-07
DBF	Pentachlorodibenzo-p-furans	DBF	4.20E-10	AP-42 Chapter 1.6	1.81E-07	7.91E-07														Biomass	1.81E-07	7.91E-07
DBF	2,3,7,8-Tetrachlorodibenzo-p-furans	DBF	9.00E-11	AP-42 Chapter 1.6	3.87E-08	1.70E-07														Biomass	3.87E-08	1.70E-07
DBF	Tetrachlorodibenzo-p-furans	DBF	7.50E-10	AP-42 Chapter 1.6	3.23E-07	1.41E-06														Biomass	3.23E-07	1.41E-06
DBD	Heptachlorodibenzo-p-dioxins	DBD	2.00E-09	AP-42 Chapter 1.6	8.60E-07	3.77E-06														Biomass	8.60E-07	3.77E-06
DBD	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxins	DBD	3.18E-11	NCDENR Memo (6/11)	1.37E-08	5.99E-08														Biomass	1.37E-08	5.99E-08

Table 6-2. Emission Factors of HAPs and Air Toxics From Wood and Litter Combustion

Wood Combustion
Emission factors HAPs and Air Toxics from wood biomass combustion in the boiler are selected from the following sources, in order of hierarchy:
1. Boiler and air pollution control device (APCD) vendor guarantees for HCl and NH3.
2. EPA AP-42 Chapter 1.6 – Wood Residue Combustion in Boilers (9/03)
3. May 2010 Emission test data for Coastal Carolina Clean Power, LLC's Kenansville, NC Facility (CCCP Kenansville) for chlorine, manganese, formaldehyde, acetaldehyde, acrolein, styrene, benzene, and toluene. CCCP

Poultry Litter and Wood Biomass Combined
Emission factors from Coastal Carolina Clean Power, LLC (Kenansville, NC). Test runs from May 2013, July 2013, and July 2014.

							Poultry Litter + Biomass Combustion															
							CC May 2013 (ES-1A)			CC July 2013 (ES-1B)			CC July 2014 (ES-1B)									
						Poultry Litter (including bedding)%	67%			Not specified			25%									
						Biomass%	33%			Not specified			75%									
						Heat Input Rate During Tests	186	MMBtu/hr		183	MMBtu/hr		180	MMBtu/hr								
			100% Wood Biomass Combustion				Stack Test Emission Factors									Maximum Emissions from Poultry Litter + Biomass Combustion				Potential Emissions		
Pollutant Category	Pollutant	CAS	Emission Factors (lb/MMBtu)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)	lb/MMBtu	lb/hr	Final lb/MMBtu	lb/MMBtu	lb/hr	Final lb/MMBtu	lb/MMBtu	lb/hr	Final lb/MMBtu	Litter/Wood Mix Emission Factor Used in Calcs (lb/MMBtu)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)
DBD	Octachlorodibenzo-p-dioxins	DBD	6.60E-08	AP-42 Chapter 1.6	2.84E-05	1.24E-04														Biomass	2.84E-05	1.24E-04
DBD	Pentachlorodibenzo-p-dioxins	DBD	1.50E-09	AP-42 Chapter 1.6	6.45E-07	2.83E-06														Biomass	6.45E-07	2.83E-06
DBD	2,3,7,8-Tetrachlorodibenzo-p-dioxin	DBD	8.60E-12	AP-42 Chapter 1.6	3.70E-09	1.62E-08														Biomass	3.70E-09	1.62E-08
DBD	Tetrachlorodibenzo-p-dioxins	DBD	4.70E-10	AP-42 Chapter 1.6	2.02E-07	8.85E-07														Biomass	2.02E-07	8.85E-07
PCB	Decachlorobiphenyl	PCB	2.70E-10	AP-42 Chapter 1.6	1.16E-07	5.09E-07														Biomass	1.16E-07	5.09E-07
PCB	Dichlorobiphenyl	PCB	7.40E-10	AP-42 Chapter 1.6	3.18E-07	1.39E-06														Biomass	3.18E-07	1.39E-06
PCB	Heptachlorobiphenyl	PCB	6.60E-11	AP-42 Chapter 1.6	2.84E-08	1.24E-07														Biomass	2.84E-08	1.24E-07
PCB	Hexachlorobiphenyl	PCB	5.50E-10	AP-42 Chapter 1.6	2.37E-07	1.04E-06														Biomass	2.37E-07	1.04E-06
PCB	Pentachlorobiphenyl	PCB	1.20E-09	AP-42 Chapter 1.6	5.16E-07	2.26E-06														Biomass	5.16E-07	2.26E-06
PCB	Trichlorobiphenyl	PCB	2.60E-09	AP-42 Chapter 1.6	1.12E-06	4.90E-06														Biomass	1.12E-06	4.90E-06
PCB	Tetrachlorobiphenyl	PCB	2.50E-09	AP-42 Chapter 1.6	1.08E-06	4.71E-06														Biomass	1.08E-06	4.71E-06
Total PCB	Total PCB	1336-36-3	7.93E-09	AP-42 Chapter 1.6	3.41E-06	1.49E-05														Biomass	3.41E-06	1.49E-05
HAP	1,3 Butadiene	106-99-0	N/A	AP-42 Chapter 1.6																		
Total HAP	Total HAP		9.77E-03		4.20E+00	18.41														Biomass	4.20E+00	18.41
TAP	Acetone	67-64-1	1.90E-04	AP-42 Chapter 1.6	8.17E-02	0.36														Biomass	8.17E-02	0.36
TAP	Benzaldehyde	100-52-7	8.50E-07	AP-42 Chapter 1.6	3.66E-04	0.002														Biomass	3.66E-04	0.002
TAP	Benzoic Acid	65-85-0	4.70E-08	AP-42 Chapter 1.6	2.02E-05	8.85E-05														Biomass	2.02E-05	8.85E-05
TAP	bis(2-chloroisopropyl)ether	108-60-1	N/A	AP-42 Chapter 1.6																		
TAP	Bromodichloromethane	75-27-4	N/A	AP-42 Chapter 1.6																		
TAP	Butylbenzylphthalate	85-68-7	N/A	AP-42 Chapter 1.6																		
TAP	n-butyraldehyde	123-72-8	N/A	AP-42 Chapter 1.6																		
TAP	Carbazole	86-74-8	1.80E-06	AP-42 Chapter 1.6	7.74E-04	0.003														Biomass	7.74E-04	0.003
TAP	Carbon disulfide	75-15-0	N/A	AP-42 Chapter 1.6																		
TAP	Carene-3	13466-78-9	N/A	AP-42 Chapter 1.6																		
TAP	2-Chlorophenol	95-57-8	2.40E-08	AP-42 Chapter 1.6	1.03E-05	4.52E-05														Biomass	1.03E-05	4.52E-05
TAP	Crotonaldehyde	123-73-9	9.90E-06	AP-42 Chapter 1.6	4.26E-03	0.02														Biomass	4.26E-03	0.02
TAP	Cymene-p	99-87-6	N/A	AP-42 Chapter 1.6																		
TAP	1,2-Dibromoethane	106-93-4	5.50E-05	AP-42 Chapter 1.6	2.37E-02	0.10														Biomass	2.37E-02	0.10
TAP	1,2-Dichloroethene	540-59-0	N/A	AP-42 Chapter 1.6																		
TAP	Diethylphthalate	84-66-2	N/A	AP-42 Chapter 1.6																		
TAP	2,5-Dimethyl benzaldehyde	5779-94-2	N/A	AP-42 Chapter 1.6																		
TAP	4,6-Dinitro-2-methylphenol	534-52-1	N/A	AP-42 Chapter 1.6																		
TAP	Di-n-octyl phthalate	117-84-0	N/A	AP-42 Chapter 1.6																		
TAP	Ethanol	64-17-5	N/A	AP-42 Chapter 1.6																		
TAP	Hexachlorobenzene	118-74-1	N/A	AP-42 Chapter 1.6																		
TAP	Hexanal	66-25-1	7.00E-06	AP-42 Chapter 1.6	3.01E-03	0.01														Biomass	3.01E-03	0.01
TAP	Isobutyraldehyde	78-84-2	1.20E-05	AP-42 Chapter 1.6	5.16E-03	0.02														Biomass	5.16E-03	0.02
TAP	Isopropanol	67-63-0	N/A	AP-42 Chapter 1.6																		
TAP	Isovaleraldehyde	590-86-3	N/A	AP-42 Chapter 1.6																		
TAP	MEK	78-93-3	5.40E-06	AP-42 Chapter 1.6	2.32E-03	0.01														Biomass	2.32E-03	0.01
TAP	Methane	74-82-8	2.10E-02	AP-42 Chapter 1.6	9.03E+00	39.55														Biomass	9.03E+00	39.55
TAP	2-Nitrophenol	88-75-5	2.40E-07	AP-42 Chapter 1.6	1.03E-04	4.52E-04														Biomass	1.03E-04	4.52E-04
TAP	alpha-Pinene	80-56-8	N/A	AP-42 Chapter 1.6																		
TAP	beta-Pinene	127-91-3	N/A	AP-42 Chapter 1.6																		
TAP	Pentanal	110-62-3	N/A	AP-42 Chapter 1.6																		
TAP	Propanal	123-38-6	3.20E-06	AP-42 Chapter 1.6	1.38E-03	0.006														Biomass	1.38E-03	0.006
TAP	alpha-Terpineol	98-55-5	N/A	AP-42 Chapter 1.6																		
TAP	m,p,o-Tolualdehyde	various	N/A	AP-42 Chapter 1.6																		
TAP	m,p-Tolualdehyde	various	1.10E-05	AP-42 Chapter 1.6	4.73E-03	0.02														Biomass	4.73E-03	0.02
TAP	o-Tolualdehyde	529-20-4	7.20E-06	AP-42 Chapter 1.6	3.10E-03	0.01														Biomass	3.10E-03	0.01

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						Biomass%	33%			Not specified			75%									
						Heat Input Rate During Tests	186	MMBtu/hr		183	MMBtu/hr		180	MMBtu/hr								
			100% Wood Biomass Combustion				Stack Test Emission Factors									Maximum Emissions from Poultry Litter + Biomass Combustion				Potential Emissions		
Pollutant Category	Pollutant	CAS	Emission Factors (lb/MMBtu)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)	lb/MMBtu	lb/hr	Final lb/MMBtu	lb/MMBtu	lb/hr	Final lb/MMBtu	lb/MMBtu	lb/hr	Final lb/MMBtu	Litter/Wood Mix Emission Factor Used in Calcs (lb/MMBtu)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source	Emissions (lb/hr)	Emissions (tpy)
TAP	1,2,4-Trichlorobenzene	120-82-1	N/A	AP-42 Chapter 1.6																		
TAP	1,1,2-Trichloroethane	79-00-5	N/A	AP-42 Chapter 1.6																		
TAP	Trichloroethene	79-01-6	3.00E-05	AP-42 Chapter 1.6	1.29E-02	0.06														Biomass	1.29E-02	0.06
TAP	Trichlorofluoromethane	75-69-4	4.10E-05	AP-42 Chapter 1.6	1.76E-02	0.08														Biomass	1.76E-02	0.08
TAP	Valeraldehyde	110-62-3	N/A	AP-42 Chapter 1.6																		
Trace Element TAP	Barium	7440-39-3	1.70E-04	AP-42 Chapter 1.6	7.31E-02	0.32														Biomass	7.31E-02	0.32
Trace Element TAP	Copper	7440-50-8	4.90E-05	AP-42 Chapter 1.6	2.11E-02	0.09														Biomass	2.11E-02	0.09
Trace Element TAP	Iron	7439-89-6	9.90E-04	AP-42 Chapter 1.6	4.26E-01	1.86														Biomass	4.26E-01	1.86
Trace Element TAP	Molybdenum	7439-98-7	2.10E-06	AP-42 Chapter 1.6	9.03E-04	0.004														Biomass	9.03E-04	0.004
Trace Element TAP	Phosphorus	7723-14-0	2.70E-05	AP-42 Chapter 1.6	1.16E-02	0.05														Biomass	1.16E-02	0.05
Trace Element TAP	Potassium	7440-09-7	3.90E-02	AP-42 Chapter 1.6	1.68E+01	73.45														Biomass	1.68E+01	73.45
Trace Element TAP	Silver	7440-22-4	1.70E-03	AP-42 Chapter 1.6	7.31E-01	3.20														Biomass	7.31E-01	3.20
Trace Element TAP	Sodium	7440-23-5	3.60E-04	AP-42 Chapter 1.6	1.55E-01	0.68														Biomass	1.55E-01	0.68
Trace Element TAP	Strontium	7440-24-6	1.00E-05	AP-42 Chapter 1.6	4.30E-03	0.02														Biomass	4.30E-03	0.02
Trace Element TAP	Thallium	7440-28-0	N/A	AP-42 Chapter 1.6																		
Trace Element TAP	Tin	7440-31-5	2.30E-05	AP-42 Chapter 1.6	9.89E-03	0.04														Biomass	9.89E-03	0.04
Trace Element TAP	Titanium	7440-32-6	2.00E-05	AP-42 Chapter 1.6	8.60E-03	0.04														Biomass	8.60E-03	0.04
Trace Element TAP	Vanadium	7440-62-2	9.80E-07	AP-42 Chapter 1.6	4.21E-04	0.002														Biomass	4.21E-04	0.002
Trace Element TAP	Yttrium	7440-65-5	3.00E-07	AP-42 Chapter 1.6	1.29E-04	5.65E-04														Biomass	1.29E-04	5.65E-04
Trace Element TAP	Zinc	7440-66-6	4.20E-04	AP-42 Chapter 1.6	1.81E-01	0.79														Biomass	1.81E-01	0.79
TAP	Chloride	16887-00-6	N/A	AP-42 Chapter 1.6																		
TAP	Flouride	16984-48-8	N/A	AP-42 Chapter 1.6																		
TAP	Propylene	115-07-1	N/A	AP-42 Chapter 1.6																		
TAP	Ammonia slip	7664-41-7	1.60E-02	Vendor Guarantee.	6.88E+00	30.13														Biomass	6.88E+00	30.13
TAP	Sulfuric acid mist	7664-93-9	0.011	Vendor Guarantee. Use of low sulfur content wood.	4.73E+00	20.72										0.031	Vendor Guarantee. Proper fuel Mix.	13.33	58.39	Poultry Litter + Biomass	1.33E+01	58.39

ABBREVIATIONS:
- POM = Polycylic Organic Matter
- DBF = Dibenzofurans
- DBD = Dibenzodioxins
- PCB = Polychlorinated biphenyls

Notes

1. Chlorine emissions from 100% wood combustion are higher than litter/wood mix. Therefore, wood only combustion factor used.

APPENDIX C

PPUSA NHSM Determination Letter

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Air Quality

Pat McCrory
Governor

Sheila C. Holman
Director

John E. Skvarla, III
Secretary

March 8, 2013

Mr. Kerry Varkonda
Development Director
Poultry Power, USA
4300 Marsh Landing Parkway, Suite 201
Jacksonville Beach, FL 32250

SUBJECT: Applicability Determination No. 2131
Poultry Power USA
NHSM Determination

Dear Mr.Varkonda:

The North Carolina Division of Air Quality (NC DAQ) received your letter dated November 27, 2012 summarizing your analysis of used poultry litter from various sources. The NC DAQ received additional information in a letter dated January 31, 2013 as well as various e-mail correspondences submitted by Ms. Fern A. Paterson of Parker Poe Adams & Bernstein LLP on your behalf. Poultry Power USA (PPUSA) is proposing to burn used poultry litter as a fuel in a new boiler. The boiler will be used to generate steam for the production of electricity.

Used poultry litter is a non-hazardous secondary material (NHSM) within the meaning of Title 40, Part 241 of the Code of Federal Regulations (40 CFR Part 241). The used poultry litter described in your correspondence referenced above will be processed by PPUSA. It meets the legitimacy criteria provided in 40 CFR §241.3. The NC DAQ has determined, therefore, the combustion of this material would not be subject to the requirements of the Commercial and Industrial Solid Waste Incineration (CISWI) emission standard. This determination relies on the language of the recently published Federal rules defining NHSM, and 40 CFR Part 60, Subpart CCCC. As the former is only effective as of April 8, 2013, please be advised that this determination is not effective until that date.

Background

On February 7, 2013 the EPA published revisions to the CISWI regulations and the Solid Wastes Used as Fuels or Ingredients in Combustion Units rule (also known as the NHSM rule).[1] The CISWI rule (for new units) will become effective on August 7, 2013. It includes a definition of "contained gaseous material" and indicates that the definition of solid waste given in 40 CFR §258.2 is to be used to determine if a material is a solid waste.

[1] 78 Fed. Reg 9112 (2013).

Permitting Section
1641 Mail Service Center, Raleigh, North Carolina 27699-1641
217 West Jones Street, Raleigh, North Carolina 27603
Phone: 919-707-8405 / Fax: 919-715-0717
Internet: www.ncair.org

Note that the NHSM rule still states that "non-hazardous secondary materials that are combusted are solid wastes," unless they can be exempted under either 40 CFR §241.3(b) or through a petition to the US EPA under 40 CFR §241.3(c). The EPA's interpretation makes it clear that to be subject to the CISWI rule a unit must burn a "solid waste" as that term is defined at 40 CFR §258.2 *and* does not qualify for one of the NHSM exemptions at 40 CFR §241.3. If the material is not a solid waste as defined in 40 CFR §258.2, its combustion is not subject to CISWI. Alternatively, the combustion of a solid waste can be exempt from CISWI if the conditions under 40 CFR Part 241 can be met.

Whether a material is a solid waste depends on whether 40 CFR §258.2 or the NHSM rule is being relied upon. Recent memoranda from the NC DOJ are instructive in both contexts. Specifically, the NC DOJ memorandum of September 28, 2009 described ten factors that define whether a material is a solid waste under 40 CFR §258.2. Alternatively, the NC DOJ memorandum of July 20, 2011 defines whether a material is a solid waste in the context of the NHSM rule, and lists five factors that should be considered when making the determination under three subparts of that rule.[2]

Project as Described

PPUSA is developing a project to construct a new boiler fueled by processed used poultry litter. The project is being developed in response to the Renewable Energy and Energy Efficiency Portfolio Standards (REPS) adopted by the North Carolina state legislature in 2007. Under the REPS, North Carolina electric power suppliers are required to utilize used poultry litter as a resource to generate at least 900,000 megawatt-hours (MWh) of electricity by the year 2014.

Once operational, the PPUSA plant would produce electricity and Renewable Energy Certificates (REC) which would be sold to electric utilities and/or cooperatives. As part of the project, PPUSA plans to install a new boiler, emissions control equipment, and fuel handling, storage and processing equipment. PPUSA is currently preparing its air permit application for submission to NC DAQ. The purpose of this letter and analysis is to evaluate the proposed use of used poultry litter as fuel.

PPUSA will produce the fuel by gathering used poultry litter from nearby poultry houses and processing it into a non-solid waste fuel. Based on the description of the process, and the chemical analysis of the material, NC DAQ determines that the processed used poultry litter meets the legitimacy criteria in 40 CFR § 241.3(d)(1) and is a non-solid waste fuel pursuant to 40 CFR § 241.3(b)(4).

Analysis under 40 CFR Part 241

The NHSM definitional rule defines "processing" in 40 CFR § 241.2 as:
...any operations that transform discarded non-hazardous secondary material into a non-waste fuel or non-waste ingredient product. Processing includes, but is not limited to, operations necessary to: Remove or destroy contaminants; significantly improve the fuel characteristics of the material, e.g.,

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[2] These subparts were given as,
(1) Traditional fuels and clean cellulosic biomass (40 CFR §241.2),
(2) Fuels or ingredient products used in a combustion unit that are made from discarded materials (40 CFR §241.3(b)(4)), and
(3) Scrap tires and dewatered pulp and paper sludges (40 CFR §241.4(a)(1), and (4)).

sizing or drying the material in combination with other operations; chemically improve the as-fired energy content; or improve the ingredient characteristics. Minimal operations that result only in modifying the size or the material by shredding do not constitute processing for the purposes of this definition.

PPUSA will collect used poultry litter generated from poultry farms and grow houses that are owned and operated by poultry growers in North Carolina and South Carolina. PPUSA then will prepare the used poultry litter to improve the fuel combustion properties of the used poultry litter to produce an engineered, non-solid waste fuel as follows:

- **Material Assessment & Contaminant Removal.** PPUSA personnel will visually observe each load of used poultry litter received and will physically remove observable foreign objects such as rocks and debris. The material will also be passed through a magnetic separation system to remove any ferrous metal constituents.
- **Moisture and Heat Content Testing.** PPUSA will test the moisture content of each load and determine the approximate lower heating value (LHV) of the material as received.
- **Sampling and Contaminant Level Analysis.** PPUSA will collect representative samples of the used poultry litter. The samples will be analyzed by a laboratory to determine the contaminant levels and ensure the levels are comparable to those in traditional solid fuels, including coal and biomass.
- **Storage.** Following contaminant removal and sampling, the used poultry litter will be stored. Storage of the used poultry litter will be segregated by moisture content.
- **Screening and Sizing.** PPUSA will screen the used poultry litter to produce material with the appropriate size, surface area, and density for efficient combustion in a boiler designed for solid fuel firing.
- **Blending.** The used poultry litter will be blended as needed to achieve the proper moisture and heat content for efficient combustion.

The steps listed above, including the removal of metal contaminants, sampling, testing, analysis, blending, and enhancement of fuel characteristics including size, surface area, density, and moisture content, transform the used poultry litter into a non-solid waste fuel.[3]

I. Legitimacy Criteria

Under 40 CFR § 241.3, a NHSM that is burned is a solid waste unless it can meet the criteria listed in 40 CFR §241.3(b) or 40 CFR §241.4(a). For the particular NHSM of processed used poultry litter the legitimacy criteria are given in 40 CFR §241.3(d)(1) and state that the NHSM must: (a) be managed as a valuable commodity; (b) have meaningful heat content and be used as a fuel in a combustion unit with energy recovery; and (c) contain contaminants or groups of contaminants at levels comparable in concentration to or lower than those in traditional fuels which the combustion unit is designed to burn. The used poultry litter that PPUSA proposes to burn meets each of these three criteria as detailed below.

a. <u>Managed as a Valuable Commodity – 40 CFR 241.3(d)(1)(i)</u>

[3] *See* Letter from Becky Weber, Director, Air and Waste Mgmt. Div., U.S. EPA, Region 7, to Mr. Gregory Haug, P.E., Resource Enterprises, LLC (Apr. 3, 2012), available at http://www.epa.gov/osw/nonhaz/define/pdfs/Lhoist-engineered-fuels.pdf.

NHSMs that are managed as a valuable commodity must not be stored for a period that exceeds reasonable time frames and must be managed in a manner that is consistent with analogous fuels (or otherwise adequately contained to prevent releases to the environment). PPUSA will store the used poultry litter in an enclosed building for a period not to exceed 90 days prior to burning the material as a fuel. PPUSA anticipates that processed fuel will typically be stored for approximately four days prior to use in the energy system. The purpose of maintaining the used poultry litter in an enclosed building is to prevent loss of the material to the environment, manage odors from the material, and limit moisture content in the fuel. The storage operations are consistent with typical management of wood chips and other biomass fuels.

b. Meaningful Heating Value – 40 CFR 241.3(d)(1)(ii)

In the preamble to the final NHSM definitional rule, the EPA indicated that materials with heat contents of less than 5,000 British thermal units per pound (Btu/lb) contain meaningful heat "if the energy recovery unit can cost-effectively recover meaningful energy from the NHSM used as fuel."[4] Factors that may be considered include "whether the facility encounters a cost savings due to not having to purchase significant amounts of traditional fuels they otherwise would need, whether they are purchasing the non-hazardous secondary materials to use as a fuel, whether the non-hazardous secondary materials they are combusting can self-sustain combustion, and whether their operation produces energy that is sold for a profit…."[5]

PPUSA analyzed the heat content of used poultry litter samples collected from poultry houses in North Carolina and South Carolina. PPUSA proposes to burn used poultry litter from these and other similarly situated poultry farms. The used poultry litter that was sampled and tested is expected to be representative of the used poultry litter that PPUSA proposes to burn. The lower heating value (as received) of the sampled material ranges between 1,917 and 5,735 Btu/lb. The average lower heating value (as received) is 3,992 Btu/lb. The average higher heating value of the used poultry litter (as received) is 4,435 Btu/lb. As a basis of comparison, the higher heating value of green wood chips (as received) on a wet basis is 4,300 Btu/lb. A summary of the data received on the heat content of the used poultry litter is provided in Attachment 1 of your November 27, 2012 submittal.

PPUSA proposes to burn the processed used poultry litter in an energy system that will be self-sustaining and able to fire the used poultry litter without the addition of supplemental fuels after startup. The energy system will cost-effectively recover meaningful energy from the used poultry litter, which will be sold at a profit to electric utilities through REC sales agreements. Because the used poultry litter will be burned in a self-sustaining combustion system to recover energy that will be sold for a profit, the material has meaningful heating value and meets the legitimacy criterion under 40 CFR 241.3(d)(1)(ii). Whether the process may or may not be profitable in the absence of the NC REPS is not considered.

c. Comparable Contaminant Concentrations – 40 CFR 241.3(d)(1)(iii)

For an NHSM to be classified as a non-solid waste fuel, it must "contain contaminants or groups of contaminants at levels comparable in concentration to or lower than those in traditional fuel(s) which

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[4] 76 Fed. Reg. 15,541 (Mar. 11, 2011).
[5] 76 Fed. Reg. 15,523 (Mar. 11, 2011).

the combustion unit is designed to burn."[6] The US EPA issued a Comparable Contaminant Guidance Concept Paper indicating its intent to "address questions raised by industry, assist them in making determinations under the rule, and ensure their use of the flexibility embodied in the rule."[7] The guidance was provided on November 29, 2011, including tables that provide both a range and an average of compiled contaminant concentrations for coal, untreated wood and biomass materials, and fuel oils.[8] It is US EPA's stated intent that contaminant levels should be compared in such a manner that traditional fuel samples could not be "considered solid waste if burned in the very combustion units designed to burn them."[9] Further clarification was provided in the February 7, 2013 rule noting that "when comparing contaminant levels between NHSMs and traditional fuels, persons are not limited to comparing average concentrations. Traditional fuel contaminant levels can vary considerably and the full range of contaminant values may be used."[10] It is important to note that the traditional fuel used in the comparison need not be the traditional fuel the applicant will burn or is even permitted to burn. The only requirement is that the unit is designed to burn the traditional fuel used in the comparison.[11] This means that the unit will be subject to emission standards different, and possibly less stringent than those that would be required had the unit been permitted to burn the traditional fuel used in the comparison.

The EPA also clarified somewhat what the method of comparison used should measure. To avoid a metric comparison that would possibly define a traditional fuel itself as not meeting the legitimacy criteria, applicants should use the entire range of contaminant values of traditional fuels to compare with values in the NHSM. However, the comparison must also recognize the variability of contaminant values in the NHSM. That is, "the full range of traditional fuel contaminant values can only be used if persons also consider some measure of variability in the NHSM contaminant data."[12] It is not clear, unfortunately, whether the EPA believes that the maximum stated values provided for traditional fuels are the actual maximum values or not. Alternatively, the EPA would recognize the variability of contaminant levels in the traditional fuels.

The EPA has also approved the processing of mixed NHSM streams in which the average contaminant level of the mixture is used in the comparison rather than comparing the contaminant levels in each NHSM material stream contributing to the ultimate processed fuel. US EPA used this approach because the concentrations of the individual NHSM material streams were "not reflective of the concentration . . . in the engineered fuel products." Later the EPA affirmed that the processed mixture would be sampled and tested to confirm legitimacy. This indicates that materials may be blended in order to reduce their contaminant levels to below the traditional fuel levels. This would be distinguished from the prohibition of this method for the definition of hazardous waste (so-called "Mixture Rule"). PPUSA is similarly proposing to produce a non-solid waste fuel by collecting multiple streams of used poultry litter collected from different poultry houses in North Carolina and

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[6] 40 CFR 241.3(d)(1)(iii).

[7] US EPA, "Non-Hazardous Secondary Materials (NHSM) Rule: Comparable Contaminant Guidance Concept Paper" (July 11, 2011), available at http://www.epa.gov/osw/nonhaz/define/pdfs/nhsm-concept.pdf.

[8] US EPA, "Contaminant concentrations in Traditional Fuels: Tables for Comparison" (November 29, 2011), available at http://www.epa.gov/osw/nonhaz/define/pdfs/nhsm_cont_tf.pdf.

[9] 76 Fed. Reg. 80841 (Dec. 23, 2011). *See also* Letter from Donald R. van der Vaart, Chief, Permit Section, NC Div. Air Quality, to Mr. John Prestage, Sr. Vice President, Prestage Farms, P. 6 (July 19, 2012), available at http://www.ncair.org/permits/memos/prestage%20farms%20NHSM%20determination.pdf.

[10] 78 FR 9112 at 9144. (Feb. 7, 2013).

[11] Id. at 9145.

[12] Id. at 9152.

South Carolina. The NHSM streams will then be processed to produce the final fuel product. Nonetheless, the NC DAQ did not use the US EPA approach for the contaminant concentration analysis, but rather looked at the variability of contaminant concentrations in sampled used poultry litter streams, and compared the upper prediction limits (UPLs) to the high end of the traditional fuel levels.

The EPA has made clear that no single statistical method or test should be defined in this regard.[13] In one instance the EPA responded to a commenter who compared the 99% UPL of chlorine in pulp and paper sludge with "chlorine concentrations observed in coal."[14] In a subsequent discussion, the EPA offered as an example method that met their approval the comparison of the 90% predicted level of the contaminant in the NHSM with the maximum value in the traditional fuel.[15] Therefore, the US EPA has condoned comparing of UPLs against the maximum traditional fuel levels based on either a 99% or 90% confidence level. It is not clear whether US EPA would condone the use of a UPL based on a confidence level below 90% in this regard.

PPUSA is proposing to install and operate an energy system that is designed to burn solid fuel, including but not limited to all coal ranks (*i.e.*, anthracite, bituminous, sub-bituminous, and lignite), wood chips, timber, bark, and other biomass. The predicted contaminant levels of the processed fuel were compared to the following contaminant levels in coal, wood, and other biomass materials:

- **Metals:** Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Mercury, Nickel, Selenium
- **Total Halogens** (including chlorine and fluorine)
- **Additional Precursors:** Nitrogen, Sulfur

Results of Comparison

There are long established statistical tests to determine whether two materials are statistically different based on samples from both material populations. However, the US EPA is simply interested in not designating a candidate NHSM as solid waste if doing so based on its contaminant level would *ever* also define the traditional fuel as a solid waste as well.[16] To this end, the US EPA has indicated that a variety of comparisons could be made. For example, the highest contaminant levels in the NHSM could be compared against the highest contaminant levels in the relevant traditional fuels. Alternatively, the average values of the NHSM could be compared with the average values of the traditional fuels. "Anything less could result in 'traditional fuel' samples being considered solid waste if burned in the very combustion units designed to burn them – not the Agency's intent in either the 2011 NHSM final rule or today's proposed rule."[17] However, using different bases for comparison could lead to different results. The US EPA warned that "[i]t would not be appropriate to compare an average NHSM contaminant value to the high end of a traditional fuel range, as the existence of an

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[13] "The agency disagrees that any one statistical tool or comparison methodology will fit every situation given the variety of NHSMs, traditional fuels, contaminants and combustion units that exist." 78 Fed. Reg. 9112 at 9168.
[14] Id.
[15] Id. at 9153.
[16] Indeed, the EPA points out in its proposed rule that, for example, the coals used in a comparison need not be limited to the coal received from either the current or past suppliers. Of course, in cases where the unit is not permitted to burn coal, but is designed to burn coal, any coal rank can be considered including anthracite, lignite, bituminous, and sub-bituminous. 76 Fed. Reg. 80477 (Dec. 23, 2011).
[17] 76 Fed. Reg. 80841 (Dec. 23, 2011).

average implies multiple data points from which a more suitable statistic (*e.g.*, range or standard deviation) could have been calculated." Finally, the EPA warned that "in the context of an inspection or enforcement action, the Agency will evaluate the appropriateness of alternative methodologies and data sources on a case-by-case basis when determining whether the legitimacy criteria have been met."[18]

In this case, each predicted contaminant concentration of the processed used poultry litter is comparable to the contaminant concentrations in coal or wood. For total halogen content, the NC DAQ calculated the UPL for various confidence intervals for the total halogen content in poultry litter on an as-fired basis. Total halogens in used poultry litter is predominately comprised of chlorine.

UPL Confidence Level	Total Halogens, ppm at 28% moisture by weight
90	8,275
95	8,870
99	10,093

According to EPA responses to comments, these values should be compared with the maximum observed total halogen content for coal on an as-fired basis, which is 8,610 ppm at 7% moisture by weight.[19] The UPL of total halogens in used poultry litter based on a 90% confidence level is below the maximum concentration of total halogens in coal. Therefore, the total halogen concentration in used poultry litter is comparable to coal, and the material is not a solid waste. Since the poultry litter satisfies this criterion under 40 CFR §241.3 there is no reason to consider used poultry litter under the definition of solid waste under 40 CFR §258.2.

Conclusion

As described in the letters received from you or on your behalf, the used poultry litter does meet the legitimacy criteria provided in 40 CFR § 241.3(d)(1). Therefore, the NC DAQ has determined that it is not a solid waste when used as fuel in a combustion unit. As a result of this determination, the proposed boiler would not be subject to the combustion source emission standards promulgated pursuant to Section 129 of the Clean Air Act. If you have any questions regarding this determination, please contact ~~me at~~ (919) 707-8475.

Sincerely,

van der Vaart

Donald R. van der Vaart, Ph.D., J.D., P.E.
Chief

cc: Fayetteville Regional Office
Central Files

[18] 76 Fed. Reg. 80482-3. (Dec. 23, 2011).

[19] Note that the EPA approved the comparison of the UPL of the NHSM with the maximum value for the traditional fuel rather than with the UPL of the traditional fuel.

APPENDIX D

Zoning Consistency Determination

EPS

1050 Crown Pointe Parkway
Suite 550
Atlanta, Georgia 30338

(404) 315-9113 *Telephone*
(404) 315-8509 *Fax*

Tri Drucker
Associate

(678) 336-8561 *Direct Line*
tdrucker@envplanning.com

March 26, 2015

Mr. Steven Vozzo, Environmental Regional Supervisor
NC DENR, Division of Air Quality
Fayetteville Regional Office, Systel Bldg.
225 Green Street, Suite 714
Fayetteville, NC 28301-5095

Subject: **Air Quality Permit Modification Application**
North Carolina Renewable Power – Lumberton, LLC
Lumberton, Robeson County, North Carolina
Air Quality Permit No. 05543T20
Facility ID: 7800166

Dear Mr. Vozzo:

The enclosed Zoning Consistency Determination forms are being submitted on behalf of North Carolina Renewable Power – Lumberton, LLC (NCRP). These forms are provided as a supplement to the application submitted on March 17, 2015.

Please call me if you have any questions or require additional information.

Sincerely,

Tri Drucker
Associate

Enclosure: Zoning Consistency Determination Forms

cc: Steve Ingle, North Carolina Renewable Power – Lumberton, LLC

Zoning Consistency Determination

Received
MAR 2 9 2017
Air Permits Section

Facility Name	North Carolina Renewable Power - Lumberton, LLC
Facility Street Address	1866 Hestertown Road
Facility City	Lumberton
Description of Process	Electric Power and Steam Generating Facility
SIC/NAICS Code	4911
Facility Contact	Steve Ingle
Phone Number	(205) 397-5157
Mailing Address	4599 East Lake Boulevard
Mailing City, State Zip	Birmingham, AL 35217

Based on the information given above:

- [x] I have received a copy of the air permit application (draft or final) AND...

- [ ] There are no applicable zoning ordinances for this facility at this time
- [x] The proposed operation IS consistent with applicable zoning ordinances Enclosed Special Use Permit
- [ ] The proposed operation IS NOT consistent with applicable zoning ordinances (please include a copy of the rules in the package sent to the air quality office)
- [ ] The determination is pending further information and can not be made at this time
- [ ] Other:

Agency	City of Lumberton
Name of Designated Official	ArTriel Askew Kirchner
Title of Designated Official	Assistant Director of Pl + N.S
Signature	[signature]
Date	3/18/2015

Please forward to the facility mailing address listed above and the air quality office at the appropriate address as checked on the back of this form.

HOLD CITY OF LUMBERTON

2014008237
ROBESON CO, NC FEE $26.00
PRESENTED & RECORDED
11-04-2014 09:08:51 AM
VICKI L LOCKLEAR
REGISTER OF DEEDS
BY: YOLANDA WILLIAMS
DEPUTY
BK: D 1970
PG: 704-706

NORTH CAROLINA **SPECIAL USE PERMIT**

ROBESON COUNTY

APPLICANT:	Poultry Power USA
PROPERTY OWNER:	Alamac Acquisitions, LLC. (1018-03-001) & Lumberton Investments 1, LLC. (1018-03-001-01)
FILE NUMBER:	11.012
TAX MAP:	1018-03-001 and 1018-03-001-01
DEED REFERENCE:	Deed Book 1189 Page 804 and Deed Book 1738 Page 809
PROPOSED USE:	Gasification and steam/electric power cogeneration facility
MEETING DATE:	September 16, 2014

On the date listed above, the Board of Adjustment of the City of Lumberton met to consider an application to issue a Special Use Permit for the aforelisted proposed use of property at the aforelisted property location.

Having heard all the evidence and argument presented at the hearing, the Board finds that the application is complete, that the application complies with all of the applicable requirements of the Lumberton Land Use Ordinance for the development proposed, and that, therefore, the application to make use of the above-described property for the purpose indicated is hereby approved, subject to all applicable provisions of the Lumberton Land Use Ordinance and the following conditions:

(1) The applicant shall complete the development strictly in accordance with the plans submitted to and approved by this Board, a copy of which is filed in the Planning and Neighborhood Services Department of the City of Lumberton, North Carolina.

(2) In granting the Special Use Permit, the Board has placed the following additional conditions or requirements upon the owner, his successors and assigns in exercising the rights granted herein:

None Noted

(3) This permit shall automatically expire within one (1) year after the aforelisted meeting date if the use authorized herein has <u>not</u> been commenced when no substantial construction, erection, alteration, excavation, demolition, or similar work is necessary before commencement of such use or less than tem (10) percent of the total cost of all construction, erection, alteration, excavation, demolition or similar work on any development authorized herein has been completed on the site.

(4) If any of the conditions affixed hereto or any part thereof shall be held invalid or void, then this permit shall be void and of no effect.

If this permit authorizes development on a tract of land larger than one acre, nothing authorized by the permit may be done until the property owner properly executes and returns to the City the attached acknowledgement of the issuance of this permit so that the City may have it recorded in the Robeson County Registry.

IN WITNESS WHEREOF, The City of Lumberton has caused this permit to be issued in its name, and the undersigned, being all of the property owners of the above-described property, do hereby accept this Special Use Permit, together with all its conditions, as binding on them and their successors in interest.

CITY OF LUMBERTON

BY: Richard H. Page
Chairman, Board of Adjustment

ATTEST:

Dera Lynn Bledsoe
Secretary, Board of Adjustment

The undersigned, being all of the owners of the above described property, do hereby acknowledge: (1) receipt of this Special Use Permit, (2) that no work may be done pursuant to this permit except in accordance with all of its conditions and requirements, and (3) that this restriction shall be binding on them and their successors in interest.

____ (SEAL)
Owner

STATE OF NORTH CAROLINA
COUNTY OF Mecklenburg

I, Shannon H. Doster, a Notary Public in and for said County and State, do hereby certify that Thomas James McKittrick personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

WITNESS my hand and Notorial Seal this ~~7th~~ 8th day of October, 20 14

Shannon H. Doster
Notary Public

My Commission Expires: 9/23/2017.

SHANNON H DOSTER
Notary Public
Mecklenburg County
My Commission Expires
09/23/2017
NORTH CAROLINA

The undersigned, being all of the owners of the above described property, do hereby acknowledge: (1) receipt of this Special Use Permit, (2) that no work may be done pursuant to this permit except in accordance with all of its conditions and requirements, and (3) that this restriction shall be binding on them and their successors in interest.

Robert Samuel Hester, CFO Alamac American Knits (SEAL)
Owner

STATE OF NORTH CAROLINA
COUNTY OF Robeson

I, Crystal Walters, a Notary Public in and for said County and State, do hereby certify that Robert Samuel Hester personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

WITNESS my hand and Notorial Seal this 9 day of Oct., 2014.

Crystal Walters
Notary Public

My Commission Expires: 10/26/2017

CRYSTAL WALTERS
NOTARY
PUBLIC
ROBESON COUNTY, NC

Zoning Consistency Determination

Received
MAR 2 9 2017
Air Permits Section

Facility Name	North Carolina Renewable Power - Lumberton, LLC
Facility Street Address	1866 Hestertown Road
Facility City	Lumberton
Description of Process	Electric Power and Steam Generating Facility
SIC/NAICS Code	4911
Facility Contact	Steve Ingle
Phone Number	(205) 397-5157
Mailing Address	4599 East Lake Boulevard
Mailing City, State Zip	Birmingham, AL 35217

Based on the information given above:

- [x] I have received a copy of the air permit application (draft or final) AND...
- [ ] There are no applicable zoning ordinances for this facility at this time
- [ ] The proposed operation IS consistent with applicable zoning ordinances
- [ ] The proposed operation IS NOT consistent with applicable zoning ordinances (please include a copy of the rules in the package sent to the air quality office)
- [ ] The determination is pending further information and can not be made at this time
- [x] Other: Not within our Zoning jurisdiction

Agency	Robeson County
Name of Designated Official	Dixon Ivey, Jr.
Title of Designated Official	Director Planning & Inspections
Signature	[signature]
Date	3/18/15

Please forward to the facility mailing address listed above and the air quality office at the appropriate address as checked on the back of this form.

EPS

APPENDIX E

BACT Analysis

Prepared for:

NORTH CAROLINA RENEWABLE POWER - LUMBERTON, LLC
1866 Hestertown Road
Lumberton, NC 28359

PSD BACT ANALYSIS
North Carolina Renewable Power – Lumberton, LLC
Lumberton, North Carolina

Prepared by:

EPS

1050 Crown Pointe Parkway, Suite 550
Atlanta, Georgia 30338
Tel: 404-315-9113

March 2017

PSD BACT ANALYSIS
NORTH CAROLINA RENEWABLE POWER – LUMBERTON, LLC
1866 Hestertown Road
Lumberton, NC 28359

Prepared for:

NORTH CAROLINA RENEWABLE POWER - LUMBERTON, LLC
1866 Hestertown Road
Lumberton, NC 28359

Prepared by:

EPS

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Suite 550
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Frank Burbach
Principal

March 2017

EPS

PSD BACT ANALYSIS
NORTH CAROLINA RENEWABLE POWER – LUMBERTON, LLC
1866 Hestertown Road
Lumberton, NC 28359

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ATTACHMENTS

1 INTRODUCTION

NCRP's biomass power plant in Lumberton, North Carolina consists of two 215 MMBtu/hr stoker boilers that provide steam to an electrical generator. The boilers were previously permitted to burn coal, natural gas, fuel oil, tire derived fuel, pelletized paper, flyash briquette, and non-Commercial and Industrial Solid Waste Incineration (CISWI)-subject wood. In Permit No. 05543T21, coal and tire derived fuels were removed from the fuel mix and poultry litter was added as a fuel. NCRP continued to use non-CISWI-subject wood, but discontinue the use of coal, natural gas, tire derived fuel, and flyash briquette, and will only use fuel oil for startup purposes. The poultry litter may comprise up to 85% of the fuel input.

Because the facility is a major source with respect to Prevention of Significant Deterioration (PSD) regulations, an evaluation of the emissions increases resulting from the addition of poultry litter was performed to determine PSD applicability. As described in the Section 1.1 of the application, based on calculated emissions increases, PSD was triggered for carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NO_X), sulfur dioxide (SO_2), sulfuric acid mist (SAM, or H_2SO_4), particulate matter (PM), including both particulate matter 10 micrometers or less in diameter (PM_{10}) and particulate matter 2.5 micrometers or less in diameter ($PM_{2.5}$), and greenhouse gases (GHG). Accordingly, this appendix provides an analysis of Best Available Control Technology (BACT) for each of these pollutants. Additionally, North Carolina Senate Bill 3 (SB3) requires the use of BACT level control on all renewable power facilities for any New Source Review (NSR) regulated pollutants that do not trigger PSD BACT. Therefore, this BACT analysis includes lead and mercury control to satisfy the SB3 requirements.

The facility's permit already contains BACT limits for burning non-CISWI-subject wood that were established in a 2012 permit. A summary of those BACT limits alongside these newly proposed limits is presented in Table 1.1. Please note that the control technologies described in the table have been implemented at the facility and have been shown to achieve the BACT limits while burning non-CISWI wood only.

Table 1.1 BACT Limits Summary

Pollutant	Emission Limits when burning non-CISWI-subject wood [Compliance Method]	Emission Limits when burning non-CISWI-subject wood and poultry litter mix [Compliance Method]	Control Technology
Carbon monoxide (CO)	0.45 lb/MMBtu [stack test: 3-1 hr run average]	0.45 lb/MMBtu [stack test: 3-1 hr run average]	Good combustion control
Volatile organic compounds (VOC)	0.03 lb/MMBtu [stack test: 3-run average]	0.03 lb/MMBtu [stack test: 3-run average]	Good combustion control
Nitrogen oxides (NO_X)	0.125 lb/MMBtu [CEMS: 30-day rolling average]	0.125 lb/MMBtu [CEMS: 30-day rolling average]	Selective non-catalytic reduction (SNCR)
Sulfur dioxide (SO_2)	0.025 lb/MMBtu [CEMS: 30-day rolling average]	0.16 lb/MMBtu [CEMS: 30-day rolling average]	Dry sorbent injection
Sulfuric acid mist (SAM)	0.011 lb/ MMBtu [stack test: 3-run average]	0.027 lb/ MMBtu [stack test: 3-run average]	Dry sorbent injection
PM (filterable only)	0.030 lb/MMBtu [stack test: 3-run average]	0.030 lb/MMBtu [stack test: 3-run average]	Multi-cyclone and baghouse
PM_{10} (filterable & condensable)	0.036 lb/MMBtu [stack test: 3-run average]	0.036 lb/MMBtu [stack test: 3-run average]	Multi-cyclone and baghouse
$PM_{2.5}$ (SAM, filterable, and condensable)	0.011 lb/MMBtu [stack test: 3-run average]	0.027 lb/MMBtu [stack test: 3-run average]	Multi-cyclone and baghouse
Lead (SB3 BACT Only)	NA	2.86×10^{-5} lb/MMBtu	Multi-cyclone and baghouse
Mercury (SB3 BACT Only)	5×10^{-6} lb/MMBtu [stack test: 3-run average]	5×10^{-6} lb/MMBtu [stack test: 3-run average]	Multi-cyclone and baghouse
Greenhouse Gases (CO2e)	NA	438,825 tons/yr [rolling 12-month estimates]	Good combustion control

1.1 BACT Determination Approach

The BACT analysis considers the technical practicability and economic reasonableness of control options using the "top-down" approach outlined in EPA's "New Source Review Workshop Manual" (Draft, October 1990).

The key steps in determining BACT for a project include:

1. Identify all control technologies

2. Eliminate technically infeasible options
3. Rank remaining control technologies by control effectiveness
4. Evaluate most effective controls, and
5. Select BACT.

Also, BACT does not include redefining of a source and must be an available technology that has been demonstrated successfully in operation. For a boiler specifically, the BACT review does not require consideration of alternate fuels if the boiler is not already designed to burn the alternate fuel.

The following resources were used to evaluate available control technology options:

- The EPA RACT/BACT/LAER Clearinghouse (RBLC)
- Other Federal and State NSR permits, permit applications, and associated reports
- Literature search of recent control technology for similar units

Fibrominn Biomass Power Plant[1] in Minnesota ("Fibrominn") was the only identified wood/poultry litter-fired facility with BACT limits that had been achieved/demonstrated. An excerpt of the relevant BACT limits are included in Attachment A of this analysis.

[1] Fibrominn Biomass Power Plant Permit http://www.pca.state.mn.us/index.php/view-document.html?gid=10861

2 Carbon Monoxide and Volatile Organic Compound BACT

CO and VOCs are generated during the combustion process as the result of incomplete thermal oxidation of the carbon contained within the fuel. Emissions can be decreased by controlling several factors such as boiler design, excess oxygen, combustion residence time, and proper air-fuel ratio.

2.1 Identify All Control Technologies

Potentially applicable CO and VOC control technologies are:

- Catalytic oxidation,
- Thermal oxidation, and
- Good combustion practices

Catalytic Oxidation: Catalytic oxidation (also called catalytic incineration) is a post-combustion control that oxidizes CO to carbon dioxide (CO_2) and causes the destruction of VOCs in the presence of a catalyst. An acceptable flue gas temperature range for catalyst operation is 450°F to 1,100°F. The oxidation process takes place spontaneously, without requiring any additional reactants into the flue gas stream. The catalyst serves to lower the activation energy necessary for complete oxidation of these incomplete combustion products. Catalytic oxidation has been used primarily to control CO and VOC on combustion turbines firing natural gas. Oxidation catalysts are susceptible to deactivation due to impurities present in the exhaust gas stream. Arsenic, iron, sodium, phosphorus and silica will act as catalyst poisons causing a reduction in catalyst activity and pollutant removal efficiencies. Oxidation catalysts are also subject to masking and/or blinding by fly ash contained in the exhaust gas stream of a biomass fired boiler. Because of the potential for oxidation catalyst fouling and/or deactivation on the biomass-fired boilers, the catalyst units must be located downstream of the particulate control device (fabric filter). Therefore, a supplemental burner will be necessary to reheat the flue gas to the requisite temperatures. Additionally, these systems can be sensitive to the VOC inlet stream flow conditions and can contribute to catalyst deactivation.[2]

[2] Air Pollution Control Technology Factsheet – Catalytic Incinerator
https://www3.epa.gov/ttncatc1/cica/files/fcataly.pdf

Thermal Oxidation: Thermal oxidation (also called thermal incineration) causes the destruction of CO and VOCs through a separate combustion process. The process destroys CO by passing the gas stream though a high temperature region. It consists of a combustion chamber, a burner, and a heat exchanger/shell that preheats the incoming air. Thermal oxidizers are usually operated between 1,500°F and 1,800°F to achieve an 85% reduction in CO. The thermal oxidizer components are subject to fouling by PM. Accordingly, for biomass-fired boilers, the thermal oxidizer would need to be located downstream of the boiler's PM control device. In addition, a thermal oxidizer requires a source of supplemental fuel, typically natural gas, to raise the exhaust stream to the required oxidation temperature.

Good Combustion Practices: Good combustion practices are based on proper boiler design and proper operation of the boiler. Good combustion practices mean operation of the boiler at high combustion efficiency, thereby reducing products of incomplete combustion. Good combustion practices include operation at sufficiently high combustion temperatures, adequate residence time, adequate excess air, and adequate turbulence, which ensures good mixing and availability of oxygen for efficient combustion. Reducing emissions of CO and VOCs can be accomplished by increasing the air available for combustion and/or the combustion temperature. However, proper balance should be maintained in order to avoid increase in NO_X emissions.

2.2 Eliminate Technically Infeasible Options

Catalytic oxidation requires detailed knowledge of the influent stream is needed. The composition of the poultry litter is expected to vary, so the presence of compounds that could potentially act as catalyst poisons will be unknown. Therefore, it is considered technically infeasible to use catalytic oxidation as the control technology for CO and VOC reduction.

Thermal oxidation has primarily been applied to industrial exhaust streams to reduce VOC and hazardous air pollutant (HAP) emissions. The conversion of CO into CO_2 is a by-product of the process. Thermal oxidation is applicable only to gas streams with high levels of CO, VOCs and HAPs, such as chemical processing facilities. Due to the expected concentration of CO from the boilers, this control technique is considered technically infeasible because the CO emission rate is not expected to improve from an add-on thermal oxidation process.

Therefore, good combustion practices is the only demonstrated and technically feasible control measure for CO and VOC reduction for the wood/poultry litter-fired boilers.

2.3 Rank Remaining Options

Good combustion practices provide efficiencies up to 50% CO and VOC control.

2.4 Evaluate Most Effective Controls

There are no additional costs or significant collateral environmental issues that would eliminate good combustion practices as BACT.

2.5 BACT Determination for CO

The facility proposes good combustion practices to minimize CO and VOC emissions from the wood/litter-fired boilers. By utilizing good combustion practices, the facility can achieve a CO emission rate of 0.45 lbs/MMBtu on a 30-day rolling average from each boiler when combusting a mix of wood and poultry litter as fuel. Good combustion will also achieve the previously-determined VOC BACT limit for wood combustion of 0.03 lb/MMBtu. This control technology is consistent with the technology implemented in the Fibrominn permit action (Attachment A) for wood/poultry-litter fired boilers.

3 NITROGEN OXIDES BACT

NO_X primarily consists of nitrogen oxide (NO) and nitrogen dioxide (NO_2). NO_X emissions from combustion sources consist of two components: thermal NO_X and fuel NO_X. Thermal NO_X results when atmospheric nitrogen is oxidized at the high temperatures occurring in the boiler firebox to yield NO, NO_2, and other oxides of nitrogen. Most thermal NO_X is formed in high-temperature areas where combustion air has mixed sufficiently with the fuel to produce a peak temperature. The rate of formation of thermal NO_X is a function of residence time and free oxygen and varies exponentially with peak flame temperature. Fuel NO_X is formed from oxidation of chemically bound nitrogen present in the fuel. Most boiler NO_X emissions originate as NO. NO generated by the combustion process is further oxidized downstream of the combustion zone or in the atmosphere to the more stable NO_2 molecule.

3.1 Identify All Control Technologies

Potentially applicable NO_X control technologies are:

- Selective catalytic reduction (SCR),
- Regenerative selective catalytic reduction (RSCR),
- Selective non-catalytic reduction (SNCR), and
- Flue gas recirculation (FGR)

Selective Catalytic Reduction (SCR): The SCR is a post-combustion control technology that involves a catalyst bed installed upstream of the PM control device, between the boiler economizer and combustion air preheater. The temperature range of flue gas at this point is between 650°F and 750°F. Ammonia is injected into the flue gas stream and catalytically reduces the NOx to molecular nitrogen and water. Reductions of 70-90%[3] can be achieved from this technology. An SCR is technically infeasible for biomass combustion because the flue gas is heavily laden with alkali/alkaline compounds and causes rapid catalyst deactivation. The alkaline nature of wood ash has been known to deactivate the SCR catalyst by poisoning and fouling. Poisoning is the main cause of catalyst deactivation since alkaline salts, which embed into the pores of the catalyst, and sodium cause irreversible poisoning.

[3] Air Pollution Control Technology Factsheet – SCR http://www.epa.gov/ttn/catc/dir1/fscr.pdf

Regenerative Selective Catalytic Reduction (RSCR): RSCR is another type of SCR capable of achieving an NO_x removal efficiency of greater than 80%. It is called regenerative SCR because it has a highly efficient direct heat transfer which results in an overall heat recovery of greater than 95%. The "hot-side" SCR is a conventional SCR system (described above) that is located prior to the air heater and upstream of the PM control device where the flue gas exhaust stream is at the optimum temperature range of 650°F to 750°F. The "cold-side" SCR or RSCR, is located downstream of the PM control device. The flue gas temperature at this location is lower than the required temperature range for optimum catalytic reduction in the "hot-side" SCR system, so a natural gas- or oil-fired duct burner is used to provide supplemental fuel to increase the flue gas temperature to the appropriate range. Prior to the flue gas entering the RSCR, ammonia is injected to ensure it is well mixed with the flue gas. Then the flue gas enters the RSCR and passes upward through a ceramic bed that has been heated by the duct burner. The hot ceramic bed increases the temperature of the flue gas to a maximum of 650°F prior to passing through the catalyst bed.

Selective Non-Catalytic Reduction (SNCR): SNCR is the NO_x control measure commonly used for wood/poultry litter-fired boilers. SNCR is a post combustion control technology that involves ammonia or urea injection, but not in the presence of a catalyst. SNCR, like SCR, involves the reaction of NO_x with ammonia by which NO_x is converted to molecular nitrogen and oxygen. Without the use of a catalyst, the NO_x reduction reaction temperature must be tightly controlled between between 1,600 °F and 1,800°F for optimum efficiency. Below 1,600°F, ammonia will not fully react, resulting in unreacted ammonia that is emitted into the atmosphere (referred to as ammonia slip). If the temperature rises above 2,200°F, the ammonia added will be oxidized, resulting in an increased level of NO_x emissions.

Flue Gas Recirculation (FGR): FGR technology is based on reducing thermal NO_x formation by introducing inert flue gas, which reduces oxygen concentration and absorbs heat, thereby reducing peak flame temperatures. FGR involves extracting a portion of the flue gas from the economizer or air heater outlet and reintroducing it to the furnace through a separate duct and a fan to the combustion air duct that feeds the windbox. The recirculated flue gas is mixed with the combustion air to reduce peak flame temperature, thereby suppressing NO_x formation. FGR is most effective for natural gas and low nitrogen-containing fuels because it reduces thermal NO_x.

3.2 Eliminate Technically Infeasible Options

SCR technology has been applied to natural gas-fired electrical utility boilers ranging in size from 250 to 8,000 MMBtu/hr and is widely used for large gas turbines. Installation of a conventional SCR is not an option on wood/poultry litter-fired units due to the high levels of catalyst poisons and particulates present in the ash. The high content of soluble potassium or sodium in the wood fuels causes a rapid deactivation of the SCR catalyst. Because the potassium or sodium ion resembles the ammonium ion, the potassium or sodium ion may block access of the ammonium ion to active sites thus causing the deactivation. Similarly, RSCR is not feasible as it relies on the use of a catalyst. Therefore, the technically feasible control options for NO_X are SNCR and FGR.

3.3 Rank Remaining Options

The NO_X control technologies considered technically feasible for biomass-fired boilers are SNCR and FGR. The control efficiency ranges for the technically feasible NO_X control technologies are as follows: SNCR[4] 30-50%, FGR <20%.

SNCR is the NO_X control measure most commonly used for wood-fired boilers. SNCR typically provides up to 50% NO_X reduction. SNCR efficiency is dependent on the ratio of ammonia to NO_X. Increasing the ammonia injection rate increases the control efficiency but also increases the amount of ammonia slip. Ammonia emissions are a concern because ammonia compounds are contributors to regional haze and visibility degradation. Ammonia also is absorbed in the fly ash. Optimal operation of an SNCR system is achieved by balancing the ammonia injection rate during load changes to ensure maximum NO_X control while limiting ammonia slip from the SNCR system.

In FGR technology 10-30% the gas is re-circulated and mixed with the combustion air. The resulting dilution in the flame decreases the temperature and availability of oxygen therefore reducing thermal NO_X formation. Flue gas recirculation for NO_X control is more attractive for new boilers than as a retrofit.

3.4 Evaluate Most Effective Controls

The energy impacts associated with the installation and operation of these control technologies are considered reasonable. There are also no significant collateral environmental issues that would justify rejection of these control technologies as BACT.

3.5 BACT Determination for NO_X

The facility proposes SNCR technology to achieve a NO_X emission rate of 0.125 lb/MMBtu on a 30-day rolling average for each boiler when combusting a mix of wood and poultry litter as fuel. This control technology is consistent with the technology implemented on other permit actions

[4] Air Pollution Control Technology Factsheet – SNCR http://www.epa.gov/ttn/catc/dir1/fsncr.pdf

for wood/poultry litter-fired boilers identified during this evaluation. This control technology is also consistent with the technology implemented in the Fibrominn permit action for wood/poultry litter-fired boilers.

4 SULFUR DIOXIDE BACT

Emissions of sulfur oxides from spreader stoker boilers result from the oxidation of sulfur present in the fuel. Sulfur oxides formed during combustion are primarily SO_2 with minor amounts of sulfur trioxides (SO_3) and gaseous sulfates. These sulfur compounds form as the sulfur contained in the fuel is oxidized during the combustion process. Uncontrolled sulfur oxide emissions from biomass-fired boilers vary directly with the sulfur content. Due to the naturally occurring alkaline (i.e., calcium) content of the woody biomass fuel, a portion of the SO_2 will react within the combustion process to form calcium sulfate compounds which comes out as ash.

4.1 Identify All Control Technologies

Potentially applicable SO_2 control technologies are:

- Dry flue gas desulfurization (Dry FGD),
- Wet flue gas desulfurization (Wet FGD), and
- Inherently low sulfur fuel

Air pollution controls involve reacting SO_2 with an alkaline reagent to form sulfite and sulfate salts.

Dry Flue Gas Desulfurization (FGD): Dry FGD is an established technology, with removal efficiency typically in the range of 90%.[5] Dry FGD control systems include spray dryer absorbers, circulating dry scrubbers, and sorbent injection systems. In a spray dryer absorber control system, the combustion process exhaust stream passes through the sprayer dryer absorber upstream of a particulate matter control device. An alkaline slurry (typically lime) is injected in the spray dryer absorber using rotary atomizer or fluid nozzles. The liquid sulfite/sulfate salts that form from the reaction of the alkaline slurry with SO_2 are dried by heat contained in the exhaust stream. Fabric filter is used on the particulate control device, the alkaline reagent may further react the SO_2 that passes through the filter cake.

Circulating dryer scrubber technology uses flue gas, ash, and lime sorbent to form a fluidized bed in an absorber vessel. Water is added to the circulating dry scrubber absorber vessel to enhance the lime and SO_2 absorption reactions. Byproducts leave the absorber in the dry form with the flue gas for subsequent removal by the downstream particulate control device.

[5] Air Pollution Control Technology Factsheet – FGD http://www.epa.gov/ttn/catc/dir1/ffdg.pdf

A dry sorbent injection (DSI) system pneumatically injects a powdered sorbent directly into the furnace, the economizer, or downstream ductwork. DSI systems typically use calcium or sodium based alkaline reagents. A DSI system requires no slurry equipment or reactor vessel because the sorbent is stored and injected dry into the flue duct where it reacts with the SO_2. The sulfite/sulfate salt reaction products are then removed using particulate control equipment. Newer DSI applications have achieved greater than 90% SO_2 control efficiencies.

Wet FGD: In a wet FGD system, the flue gas passes through a recirculating alkaline slurry that absorbs and neutralizes the SO_2. Most wet FGD systems use limestone or lime as the alkali source. The performance of a wet FGD system varies with individual unit design; however, removal efficiencies in the range of 98% are achievable.[6] In the wet scrubbing process, the flue gas is contacted with an alkaline solution or slurry (typically lime or limestone) in an absorber. The temperature of the flue gas is reduced to its adiabatic saturation temperature and the SO_2 is removed from the flue gas by absorption and reaction with the alkaline medium. Resulting waste product is a slurry containing both reacted and unreacted alkaline materials. There are numerous design variations of wet scrubbers, with wet limestone systems being the most common process used. Generally, for lower sulfur fuel, it is more difficult to achieve the higher percent sulfur removal rates. The range of SO_2 reduction efficiency at wet scrubber installations is higher than that for dry scrubbing.

Inherently low sulfur fuel: Wood is an inherently low sulfur fuel. Because SO_2 is generated during the combustion process as a result of the thermal oxidation of the sulfur contained in the fuel, the combustion of low sulfur fuel produces lower SO_2 emissions.

4.2 Eliminate Technically Infeasible Options

Due to location and area restrictions at the facility, an FGD system would be required to be installed upstream of the baghouse used to remove PM. For this reason, wet FGD is not feasible as it is not recommended to introduce moisture to baghouse filters.

Using inherently low sulfur fuel (wood) is not technically feasible since the fuel mixture will be up to 85% poultry litter. Low sulfur wood would not significantly impact the SO_2 emissions since the majority of the sulfur will come from the poulty litter. Additionally, the precise composition of the poultry litter is variable, so the concentrations of sulfur in the mixture will also be variable.

[6] Air Pollution Control Technology Factsheet – FGD http://www.epa.gov/ttn/catc/dir1/ffdg.pdf

4.3 Rank Remaining Options

Dry FGD may achieve removal of SO_2 emissions up to 90% depending upon the concentration of SO_2 in the exhaust gases.

4.4 Evaluate Most Effective Controls

Depending on the type and size, dry FGD systems are considered to have high capital cost and variable operations and maintenance costs.[7] Total costs range greatly from $500 to $4,000 per ton of pollutant removed for a facility of this size. However, this is not expected to be cost prohibitive at this facility.

4.5 BACT Determination for SO_2

The facility proposes to utilize a DSI system to control SO_2. Based on the anticipated sulfur content of the fuel and a DSI control efficiency of 80% (consistent with the BACT determination for Fibrominn), the facility anticipates a maximum emission rate of 0.16 lb/MMBtu on a 30-day rolling average.

[7] Air Pollution Control Technology Factsheet – FGD http://www.epa.gov/ttn/catc/dir1/ffdg.pdf

5 SULFURIC ACID MIST BACT

Small concentrations of sulfuric acid mist will be emitted from the wood/poultry-fired boilers due to the sulfur content of the wood and poutry litter fuel. H_2SO_4 is formed by the further oxidation of SO_2 to sulfur trioxide (SO_3). SO_3 readily combines with water vapor (H_2O) available in the flue gas to form H_2SO_4. When flue gas containing H_2SO_4 vapor is cooled, sulfuric acid mist condenses to form a sub-micron aerosol mist.

5.1 Identify All Control Technologies

The amount of H_2SO_4 formed is dependent upon the amount of SO_3 and water vapor present and the temperature of the flue gas. Consequently, the control of H_2SO_4 emissions will be in direct correlation with SO_2 removal. Therefore, the control technology proposed to minimize SO_2 emissions to meet BACT applies to H_2SO_4 as well.

5.2 Eliminate Technically Infeasible Options

Refer to Section 4.2 for the discussion of the technically infeasible SO_2 BACT options. These also apply to H_2SO_4.

5.3 Rank Remaining Options

A dry FGD system is the only technically feasible control measure for H_2SO_4 reduction on biomass/poultry litter-fired boilers at this facility.

5.4 Evaluate Most Effective Controls

Refer to Section 4.4 for the evaluation of dry FGD costs.

5.5 BACT Determination for H_2SO_4

The facility can achieve an H_2SO_4 emission rate of 0.027 lb/MMBtu with use of a dry sorbent injection system. This rate was developed based on emissions modeling and stack testing at the facility and is consistent with the Fibrominn permit limit of 0.031 lb/MMBtu.

6 PARTICULATE MATTER BACT

PM may fall under three categories: particles that cannot be condensed (filterable PM), filterable and condensable particles less than 10 microns in diameter (PM_{10}), and filterable and condensable particles less than 2.5 microns in diameter ($PM_{2.5}$). This section addresses all three forms of PM as their controls are similar. Also, this section includes control analysis for lead and mercury, which are subcomponents of PM and are similarly controlled.

6.1 Identify All Control Technologies

Potentially applicable PM control technologies are:

- Cyclone,
- Baghouse,
- Electrostatic precipitator (ESP),
- Wet scrubber, and
- Settling chamber

Cyclone: Cyclones are referred to as "precleaners" because they are typically used to reduce inlet loading of PM to a downstream treatment device and are often used in series. Cyclones use inertia to remove particles from the gas stream, primarily PM with diameters greater than 10 microns. The cyclone imparts centrifugal force on the gas stream, forcing particles toward the cyclone walls. Particles are collected at the bottom of the cyclone tubes as the gas stream exits the top of the tube for further treatment. The collection efficiency of cyclones varies as a function of particle size and design. However, the control efficiency range for single cyclones is estimated to be 70-90% for PM.

Baghouse: A baghouse contains sets of fabric filters used to capture primarily $PM_{2.5}$ and PM_{10}. Control efficiency for baghouses is typically in the range of 99-99.9%. Moisture and corrosives content are the most significant limits to this technology and should be considered during the design phase. Additionally, it is recommended that larger particles (>10 microns) be removed prior to treatment with fabric filters.

Electrostatic precipitator (ESP): EPSs use electrical forces to move particulates onto collector plates where there are either "rapped" off by mechanical means (dry ESP) or washed off, typically with water (wet ESP). Operating efficiencies are in the range of 90-99.9% removal.

ESPs in general are not suited for use in processes which are highly variable because they are sensitive to fluctuations in gas stream conditions.[8]

Wet scrubber: Scrubbers may be constructed in a wide variety of styles (spray chamber, Venturi scrubber, fiber-bed scrubber, etc.), but all use the same general operational theory of water droplets capturing PM in a gas stream. Depending on the style of scrubber, PM control efficiencies range from 50-99.9%

Settling chamber: Like the cyclone, a settling chamber is another style of precleaner used to primarily remove larger particulates greater than 10 microns in diameter from a gas stream. This technology uses gravity to collect the particulates prior to further treatment. Air will enter through the upper side of the chamber and travel laterally through the chamber to exit at the opposite upper side. As the gas flow travels from one side of the chamber to the other, larger particulates fall out of the air stream via gravity. Contol efficiencies vary greatly depending on the size of the chamber and the composition of the PM in the gas.

6.2 Eliminate Technically Infeasible Options

ESPs are not well-suited for highly variable gas stream conditions, such as those expected to be at this facility. Additionally, ESPs require a significant footprint for construction which is not currently available at the facility. For these reasons, an ESP is not considered a feasible control option.

Wet scrubbers create solid waste and wastewater that will need to be treated or disposed of. Due to location and sizing restrictions at this facility, the installation of such wastewater treatment system is not feasible. Offsite waste disposal may also be prohibitively high in cost.

Like the ESP and wet scrubber options, the settling chamber requires available space for consturuction which is not currently available onsite. Additionally, the settling chamber is a precleaner technology which still requires additional PM treatment. For these reasons, a settling chamber is not feasible at this facility.

6.3 Rank Remaining Options

Of the technologically feasible control alternatives, a cyclone system in series with a baghouse will have the highest removal efficiency of each type/size of PM at approximately 99.9%. As the facility already has these controls in place, no further ranking is needed.

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[8] Air Pollution Control Technology Factsheet – Dry Electrostatice Precipitator
https://www3.epa.gov/ttncatc1/cica/files/fdespwpl.pdf

6.4 Evaluate Most Effective Controls

The facility currently has an operational cyclone/baghouse system onsite; therefore, no additional costs are associated with this control option. Additionally, this combination of technologies is typically the most effective for PM removal at a facility of this type.

6.5 BACT Determination for PM

The facility proposes the use of multi-cyclones in series with a baghouse system to reduce the total PM by 99.9%, resulting in limits of 0.03 lb/MMBtu for filterable PM, 0.036 lb/MMBtu for filterable and condensable PM_{10}, 0.027 lb/MMBtu for filterable and condensable $PM_{2.5}$, 2.86×10^{-5} lb/MMBtu for lead, and 5×10^{-6} lb/MMBtu for mercury. The multi-cyclones and baghouses are currently present at the facility and were tested for PM_{10} and $PM_{2.5}$ on February 11, 2016. The test results showed an PM_{10} emission rate of 0.012 lb/MMBtu and the $PM_{2.5}$ was shown to be 0.0109 lb/MMBtu, which are below the emission limits begin requested here. The mercury emissions were tested on December 19, 2015 and the results showed an emission rate of 1.54×10^{-8} lb/MMBtu, which is also below the proposed limit.

7 GREENHOUSE GAS BACT

Three pollutants make up the greenhouse gases (GHG) formed from combustion: carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4). Only CO_2 is generated in significant quantities and is therefore the primary pollutant reviewed for BACT.

7.1 Identify All Control Technologies

Potentially applicable carbon dioxide control technologies are:

- Carbon capture and storage (CCS)
- Lower-emitting processes and practices, consisting of:
  - Boiler design
  - Lower-emitting fuels
  - Good combustion practices

Carbon Capture and Storage (CCS): CCS is an add-on technology that consists of removing CO_2 from the gas stream, transporting it to a sequestering site, and injecting it into a geological storage structure. Currently there are no full-scale storage sites available as the technology is still in the experimental stage of development.

Lower-emitting Processes and Practices: CO_2 emissions from boilers can be decreased by controlling several factors such as boiler design, fuel type, and combustion practices. These factors can be adjusted to improve the boiler's efficiency, thereby reducing the amount of fuel used to provide the steam load.

7.2 Eliminate Technically Infeasible Options

Although CCS could be considered technically feasible, there are no applications of this technology on similar facilities as the technology is still in its developmental stage. Additionally, CO_2 storage facilities are not available at this time. Therefore, CCS is eliminated from consideration. Boiler design is not feasible in NCRP's case, as the boilers are existing. Any modifications to the boilers to improve combustion will be addressed as part of the "Good Combustion Practices" option. The use of lower-emitting fuels, although technically feasible, would not be appropriate as NCRP will be burning biomass. According to EPA's Guidance for

Determining Best Available Control Technology for Reducing Carbon Dioxide Emissions from Bioenergy Production published in March 2011, biogenic CO_2 emissions have less impact on climate change than fossil fuels. Finally, good combustion practices are technically feasible at the NCRP plant.

7.3 Rank Remaining Options

The ony remaining technically feasible option is Good Combustion Practices.

7.4 Evaluate Most Effective Controls

Good combustion practices will affect boiler efficiency, thereby reducing and maintaining optimal CO_2 emissions. There are no additional costs or significant collateral environmental issues that would eliminate good combustion practices as BACT.

7.5 BACT Determination for GHG

The facility proposes good combustion practices to minimize GHG emissions from the wood/litter-fired boilers. By utilizing good combustion practices the facility can maximize fuel efficiency and thereby minimize resulting GHG emissions. This control technology is consistent with the technology implemented on other permit actions for wood/poultry litter-fired boilers identified during this evaluation. The proposed limit for GHG BACT is an annual emission limit of 438,825 tons CO_2e per year.

EPS

ATTACHMENT A

Fibrominn Biomass Power Plant Permit Excerpt

TABLE A: LIMITS AND OTHER REQUIREMENTS

Facility Name: Fibrominn Biomass Power Plant 02/17/05

Permit Number: 15100038 - 004

Subject Item: **EU 001 Biomass Boiler**

Associated Items:
CE 001 Ammonia or Urea Injection
CE 003 Wet Limestone Injection (SDA)
CE 004 Fabric Filter - High Temperature, i.e., T>250 Degrees F
MR 001 O2 Monitor (stack)
MR 002 NOx Monitor
MR 003 SO2 Monitor (stack)
MR 004 Opacity Monitor
MR 005 O2 Monitor (inlet to SDA)
MR 006 CO Monitor
MR 007 SO2 Monitor (inlet to SDA)
SV 001 Boiler

What to do	Why to do it
EMISSION LIMITS Unless otherwise noted, the emission limits below apply at all times except during periods of startup, shutdown, or malfunction. Duration of startup, shutdown, or malfunction periods are limited to 3 hours per occurrence. The startup period commences when the affected facility begins the continuous burning of biomass and does not include any warmup period when the facility is combusting natural gas or propane, and no biomass is being fed into the boiler. The use of biomass solely to provide thermal protection of the grate or hearth during startup when biomass is not being fed to the boiler is not considered to be continous burning.	hdr
Total Particulate Matter: less than or equal to 0.02 lbs/million Btu heat input based on three runs that are between 60 and 120 minutes in length.	Title I Condition: 40 CFR 52.21(j), BACT emission limit Also meets the requirements of 40 CFR 60.43b(c)
Particulate Matter less than 10 micron: less than or equal to < > lb/mmBtu, based on three runs that are between 60 and 120 minutes in length. The Permittee shall propose limits after completion of the Performance Tests required below. Permit conditions below require the completion of an inital stack performance test within 180 days of initial startup, and then quarterly thereafter until the company has completed a total of five tests. The proposed emission limit shall be submitted within 45 days of the submittal of the final test results.	Title I Condition: 40 CFR 52.21(j), BACT emission limit
Opacity: less than or equal to 20 percent on a 6-minute average, except for one 6-minute period per hour of not more than 27 percent opacity.	40 CFR 60.43b(f)
Sulfur Dioxide: less than or equal to 0.07 lbs/million Btu heat input or 80% control, whichever is least stringent based on a 24-hour hour daily geometric average emission concentration or a 24-hour daily geometric average percent reduction.	Title I Condition: 40 CFR 52.21(j), BACT emission limit
Nitrogen Oxides: less than or equal to 0.16 lbs/million Btu heat input based on a 30 day rolling average. This limit applies at all times including periods of startup, shutdown, or malfunction. The 30 day average emission rate is calculated as the average of all hourly emissions data recorded by the monitoring system during the 30 day period. A new 30 day rolling average emission rate is calculated each steam generating unit operating day.	Title I Condition: 40 CFR 52.21(j), BACT emission limit, also meets the requirements of 40 CFR 60.44b(l)
Nitrogen Oxides: less than or equal to the following during any 30-day rolling average period that both biomass and natural gas/propane are burned: Eo = [(0.10*Hgo) + (0.20*Hr)]/(Hgo + Hr) where: Eo is the NOx emission limit in lb/mmBtu Hgo is the heat input from combustion of natural gas/propane and Hr is the heat input from combustion of any other fuel (biomass)	40 CFR 60.44b(l)
Carbon Monoxide: less than or equal to 0.24 lbs/million Btu heat input based on a 24-hour daily average.	Title I Condition: 40 CFR 52.21(j), BACT emission limit
Hydrochloric acid: less than or equal to 0.034 lbs/million Btu heat input or 95% control, whichever is least stringent.	Title I Condition: 40 CFR 63.43(b), MACT emission limit