June 2021

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

Addendum to PSD Permit Application
North Carolina Renewable Power Lumberton, LLC
Lumberton, North Carolina

MONTROSE ENVIRONMENTAL
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Tel: 404-315-9113

Frank Burbach
Principal

Farhana Momin
Senior Engineer

June 2021

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APPENDICES

1 INTRODUCTION

North Carolina Renewable Power - Lumberton, LLC (NCRP) owns and operates a biomass cogeneration power plant located at 1866 Hestertown Road, Lumberton (Robeson County). The facility consists of two (2) identical 215 MMBtu/hr stoker boilers (Emission Source ID Nos. ES-1A and ES-1B), one steam turbine generator, and ancillary equipment. A PSD Permit Application was submitted to North Carolina Division of Air Quality (NCDAQ) in March 2017 to address modifications at the plant needed to combust poultry litter in the boilers (Permit Application No. 7800166.17C). Revisions to the PSD application were submitted by NCRP in June 2019 to amend the BACT limits requested in the original PSD permit application and to revise the dispersion modeling to account for the changes to the emissions. The PSD application and its revision (collectively, the "PSD Application") are currently under review by NCDAQ. NCRP notes that the two existing stoker boilers were temporarily shut down on November 1, 2020. Although the boilers are currently operational, NCRP determined that it will not restart the boilers until the requested PSD permit is issued.

More recently, NCRP has proposed to replace existing add-on emissions control devices and conduct various maintenance, repair and component replacement activities at the existing boilers (collectively, the "Boiler Maintenance"). NCRP has requested authorization to install and operate the upgraded control equipment and replace the existing exhaust stack in a minor permit modification that was submitted to NCDAQ on May 19, 2021.

This addendum to the PSD Application: (1) incorporates those control equipment changes; and (2) requests authorization to conduct the Boiler Maintenance. The proposed Boiler Maintenance is described in further detail in **Section 2** of this application. **Section 3** and **Section 4** of the addendum address the impact (or lack thereof) of the addendum on the emissions calculations, BACT determinations, and impacts analyses provided with the original PSD application and its 2019 revision.

NCRP requests that, when the PSD Application and Addendum have been reviewed and NCDAQ has prepared a draft PSD permit, NCDAQ exercise its discretion to submit the draft PSD permit for public hearing prior to permit issuance.

1.1 Application Contacts

The contact persons for additional information regarding this submittal are Mr. Carey Davis of NCRP, Mr. Frank Burbach, P.E. of Montrose Environmental Group, who is the air quality permitting consultant for this project, and Ms. Fern Paterson of Parker Poe, who is outside environmental counsel for the facility. Mr. Davis may be reached at (205) 821-4325, Mr. Burbach may be reached at (404) 861-1195, and Ms. Paterson may be reached at (704) 335-9891.

2 PROJECT DESCRIPTION

The PSD Application was submitted pursuant to the Special Order By Consent issued by NCDAQ on February 27, 2017 (SOC 2017-001) to request a major modification under the PSD regulations for the addition of non-CISWI poultry litter as a permitted fuel for the Facility (hereinafter, the "PSD Application") and to establish associated Best Available Control Technology ("BACT") limits for non-CISWI poultry litter firing. The PSD Application requests BACT limits for carbon monoxide ("CO"), nitrogen dioxide (NOx), sulfur dioxide (SO_2), volatile organic compounds ("VOC"), sulfuric acid mist ("H_2SO_4"), particulate matter ("PM", "PM10" and "PM2.5"), and carbon dioxide ("CO_{2e}").

Non-CISWI poultry litter firing was initially authorized by NCDAQ on May 29, 2015 (Permit No. 05543T21), and coal and tire-derived fuels were *removed* from the Facility's Title V permit in the same permit action. The PSD permit application was submitted on March 29, 2017, and required air dispersion modeling in support of the PSD permit application was submitted on October 29, 2017.

The purpose of this addendum is to: (1) incorporate the emissions control replacements that NCRP requested in a minor permit modification submitted to NCDAQ on May 19, 2021; and (2) request authorization to conduct the maintenance, repair and component replacement activities at the existing boilers. Additional discussion of these additions to the existing PSD permit application are described in further detail below.

Control Equipment and Stack Replacements

This addendum reflects the replacement of the emissions controls that NCRP requested in the minor modification submitted to NCDAQ on May 12, 2021. As indicated in the May 2021 application, the proposed changes to the emissions control systems are intended to more consistently and reliably control emissions from the existing boilers to meet existing control requirements, and BACT emissions limitations that are proposed in the PSD Application. The proposed changes do not modify the proposed BACT emissions limits and do not debottleneck or otherwise result in an increase of emissions from the existing emissions sources.

- Replace the two existing dry sorbent injection systems (ID Nos. CD-1A4 and CD-1B4) with a new common dry sorbent injection system (ID No. CD-1C4), which will control sulfur dioxide and hydrochloric acid (HCl) emissions from the boilers (ID Nos. ES-1A and ES-1B).
- Replace the two existing baghouses (ID Nos. CD-1A and CD-1B) with a new common baghouse (ID No. CD-1C), which will control particulate matter emissions from the boilers (ID Nos. ES-1A and ES-1B).

- Replace the common stack for the two boilers (ID Nos. ES-1A and ES-1B). The new stack will have the same height and diameter and be at the same location as the existing stack, which is being replaced due to its age and condition.
- Add one insignificant activity, a fly ash silo (ID No. IES-21), with a bin vent filter that will receive ash from the new baghouse.[1]

As part of these changes, NCRP also will replace two existing induced draft ("ID") fans downstream of the baghouses with a single ID fan located downstream of the common baghouse. The ID fans pull exhaust from the boilers through emissions control devices. The replacement ID fan will have an air flow equal to the combined air flow of the two existing fans, and the replacement ID fan will not impact the operation of the boilers or their associated uncontrolled emission rates.

A simplified flow diagram showing the proposed control configuration is provided in **Appendix B**.

Boiler Maintenance:

NCRP is requesting that NCDAQ authorize certain repair, maintenance and component replacement activities at the existing boilers, as listed in the bulleted list below:

- *Primary & Secondary Superheater Replacements*. The primary and secondary superheaters have deteriorated over time, exacerbated by chlorine in the flue gas and ash from the non-CISWI poultry litter fuel, and these boiler components will be replaced. The replacement superheaters will be located above the furnace nose in the same cavity space occupied by the existing superheaters. The superheater headers will be in the same location as the existing headers, and made of the same material and thickness. Certain design improvements will be incorporated into the replacement superheaters, as follows: (1) the tubes will include a corrosion-resistant overlays to improve durability of the superheaters; and (2) fewer pendant elements will be included in the superheater bundles in the horizontal direction to clear spacing between the tubes in the direction of the gas path. The number of tubes in the replacement superheater bundles in the front-to-back direction will not change.

- *Economizer Replacements*. Degradation of the economizers over time has also been exacerbated by chlorine in the flue gas and ash from the non-CISWI poultry litter fuel, and the economizers will be replaced. The replacement economizers will in the same location as the existing economizers and will have the same design, except that the tubes in the

[1] In Permit No. 05543T25, the facility requested the removal of fly ash silo (ID No. ES-3) with associated bin vent filter (ID No. CD-3), because the ash transport system was converted from pneumatic conveyance to mechanical conveyance ad the bin vent filter was removed. Consequently, there is no exhaust from this solo. With this application, NCRP requests authorization to install and operate a second fly ash silo (ID No. IES-21) with a bin vent filter that will receive ash from the new baghouse.

replacement economizers will be constructed of a harder and more corrosion-resistant carbon steel.

- *Overfired Air ("OFA") System*. The OFA system is being repaired and restored. OFA ports on the sidewalls of each boiler will remain in place and the existing OFA fans, ductwork, dampers, and accessories will be removed and replaced in-kind. The location of nozzles in rear and front walls of the boilers will also be optimized to allow for the adjustment of the air flow and improved air distribution over the full operating range of the Boilers.

- *Fuel Grate Repairs & Replacement*. Existing grate components will be disassembled to remove chains, grate bars, and seals in order to inspect all parts. Parts that are still in good working order will be reutilized as-is and those parts that need replacing due to wear or damage will be replaced with new grate parts. In addition, the front steel support beam on Unit B (ID No. ES-1B) is bent, and will be replaced with a new beam.

- *Replacement of furnace rear wall screen tubes*. Two rows of furnace rear wall screen tubes directly behind the superheater have deteriorated over time, and will be replaced. The number of tubes will be exactly the same at forty (40). The replacement tubes will in an in-line orientation, versus the current staggered orientation, to allow for improved cleaning and maintenance of the tubes.

Although originally designed to fire coal, the boilers were modified in 2015 to fire non-CISWI wood fuel, including non-CISWI poultry litter. Concentrations of chlorine in the flue gas and ash associated with non-CISWI poultry litter have increased the rate of degradation of boiler components, and generally required more frequent maintenance, including more frequent startups and shutdowns associated with that maintenance. The purpose of the proposed Boiler Maintenance is to: (1) repair and replace boiler components that have degraded over time; and (2) reduce maintenance and associated startup and shutdown events in the future by using corrosion-resistant replacement materials and improving spacing between superheater tubes to reduce plugging and allow for improved cleaning and maintenance.

3 EMISSIONS SUMMARY

For the purposes of this application, the pollutants of concern include regulated pollutants under the 1990 Clean Air Act Amendments, and state-regulated air toxics. These pollutants include NO_x, SO_2, PM, CO, VOC, hazardous air pollutants (HAP), and certain North Carolina air toxics.

As described further in Section 2 above, the proposed changes to the emissions controls do not revised the proposed BACT emissions limits in the proposed PSD Application. Rather, the proposed changes are intended to more consistently and reliably control emissions from the existing boilers to meet existing control requirements, and BACT emissions limitations that are proposed in the PSD Application.

The proposed Boiler Maintenance will not affect the capacity of the boilers, both which have a nominal heat input rate of 180 million Btu/hr. Hourly boiler emission rates are not expected to change. As a result of the Boiler Maintenance, the number of startups and shutdowns at the boilers is expected to drop significantly, and availability of the boilers is expected to return to 2018-2019 levels of approximately 80%.

The boilers have already triggered PSD permitting requirements for a major modification for CO, VOC, NOx, SO_2, H_2SO_4, PM, PM10, and CO_{2e}, and the BACT emissions limitations for each of these pollutants will become effective upon issuance of the pending PSD permit. The proposed Boiler Maintenance does not modify the estimated hourly emission rates or the estimated annual emission rates in the PSD Application (which are based on 8,760 hours per year), nor does the proposed Boiler Maintenance revise the proposed BACT emissions limits proposed in the PSD Application.

The proposed changes are not expected to result in increases to the potential emissions from the boilers, as presented in the PSD Application. The only emissions increase will be from the new fly ash silo (Proposed ID No. IES-21) and they are expected to be insignificant. Calculations summarizing the facility-wide potential to emit, as shown on the following page in Table 3.1, are provided in **Appendix C**.

Table 3.1 Emissions Summary

Pollutant	Facility-wide PTE (tpy)
CO	1243.54
NOx	367.46
SO_2	301.98
$PM/PM_{10}/PM_{2.5}$	111.23/97.35/67.51
VOC	365.33
Lead	0.06
Highest Individual HAP (HCl)	<10
Total HAP	<25

4 REGULATORY REVIEW

As discussed below, neither the changes to the emissions control systems nor the proposed Boiler Maintenance modify the BACT determination or the the impact analysis (dispersion modeling) provided in the PSD Application.

4.1 Best Available Control Technology

The proposed changes to the control equipment do not alter the nature of the control technologies previously determined to represent BACT. Instead they are replacements of the equipment using the same technology and have been designed to more consistently and reliably control emissions from the existing boilers to meet existing control requirements, and BACT emissions limitations that are proposed in the PSD Application. Additionally, no changes to available control technologies have emerged for emissions from this industry since the submittal of the previous BACT determinations. The proposed changes are intended to more consistently and reliably control emissions to meet the BACT emissions limitations that are proposed in the pending PSD permit.

Likewise, the proposed Boiler Maintenance will not affect the capacity of the boilers, both of which have a maximum input rate of 215 million Btu/hr, and average hourly boiler emission rates are not expected to change. As a result of the proposed Boiler Maintenance, the number of startups and shutdowns at the boilers is expected to drop significantly, and availability of the boilers is expected to return to 2018-2019 levels of approximately 80%. However, the average short-term emission rates at the boilers based on best combustion practices and proposed BACT emissions technologies (where applicable) should not change.

4.2 Dispersion Modeling

As described in **Section 2**, the new stack will have the same height and diameter and will be located at the same location as the existing stack. Additionally, the exhaust velocity will equal or exceed that of the existing stack, which was used in the previously-submitted modeling. Therefore, the air dispersion modeling submitted with the PSD Application accurately reflects the Facility, including the emissions control system replacements and proposed Boiler Maintenance, and no revised air dispersion modeling is required.

APPENDIX A
Application Forms

FORM A

GENERAL FACILITY INFORMATION

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

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** (please check one option below)
☑	Responsible Official/Authorized Contact Signature	☑	P.E. Seal (if required)	☐ Not Required ☐ ePayment ☑ Check Enclosed

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:***
Name/Title: Carey Davis, Executive Vice President	Name/Title: Carey Davis, Executive Vice President
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) 403 - 5273 Fax No.:	Primary Phone No.: (205) 403 - 5273 Fax No.:
Secondary Phone No.:	Secondary Phone No.:
Email Address: cdavis@georgiarenewablepower.com	Email Address: cdavis@georgiarenewablepower.com

Facility/Inspection Contact:	***Permit/Technical Contact:***
Name/Title: Carey Davis, Executive Vice President	Name/Title: Carey Davis, Executive Vice President
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) 403 - 5273 Fax No.:	Primary Phone No.: (205) 403 - 5273 Fax No.:
Secondary Phone No.:	Secondary Phone No.:
Email Address: cdavis@georgiarenewablepower.com	Email Address: cdavis@georgiarenewablepower.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, poultry litter, and poultry litter cake for fuel.

Facility ID No. 7800166

Primary SIC/NAICS Code: 4911 / 221117 | Current/Previous Air Permit No. 05543T27 | Expiration Date: 8/31/2022

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: Montrose Environmental Group

Mailing Address Line 1: 400 Northridge Road | Mailing Address Line 2: Suite 400

City: Atlanta | State: GA | Zip Code: 30350 | County: Sandy Springs

Phone No.: (678) 336-8531 | Fax No.: (404) 315-8509 | Email Address: fburbach@montrose-env.com

SIGNATURE OF RESPONSIBLE OFFICIAL/AUTHORIZED CONTACT

Name (typed): Carey Davis | Title: Executive Vice President

X Signature(Blue Ink): | Date:

Attach Additional Sheets As Necessary

FORM A (continued, page 2 of 2)

GENERAL FACILITY INFORMATION

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

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):

REVISED 10/17/2014

Title V Minor Modification (Prior to Permit Revision)

FORM A1 - MINOR

MINOR MODIFICATION QUALIFICATION CHECKLIST

☑	This change does not violate any existing requirement in the current Title V air quality permit.
☑	This change does not result in any significant change in existing monitoring, reporting or recordkeeping provisions in my current permit.
☑	This change does not require a case-by-case determination (e.g. BACT)
☑	This change is not a modification under Title I of the federal Clean Air Act.
☑	This change is not a significant modification. (See 15A NCAC 2Q .0516)
☑	This change does not require a change to an existing permit term that was taken to avoid an applicable requirement. (e.g. PSD avoidance condition)
☑	This change does not require a permit under the NC Toxics program.

MINOR MODIFICATION DESCRIPTION

Provide Description of Modification (e.g. Adding emergency generator): NCRP is proposing to replace the two existing baghouses (ID Nos. CD-1A and CD-1B) with a new common baghouse, with proposed ID No. CD-1C, replace the two existing dry sorbent injection systems (ID Nos. CD-1A4 and CD-1B4) with a new common system with proposed ID No. CD-1C4, and replace the existing stack with a new stack for the two boilers. The facility also proposes to add a second fly ash silo (proposed ID No. IES-21) with a bin vent filter that will receive ash from the new baghouse. The fly ash silo will be considered an insignificant unit based on its emissions.

APPLICABLE REGULATIONS TO THE PROPOSED MODIFICATION (attach additional sheets if necessary)

Emission Source	ID No.	Applicable Standard	Applicable Requirement	Proposed Monitoring, Recordkeeping, and Reporting
Note that no changes are proposed to the current applicable regulations.				

ATTACH A COPY OF THE PROPOSED PERMIT CONDITIONS FOR EACH REQUIREMENT THAT APPLIES TO THE PERMIT MODIFICATION.

SPECIFIC PERMIT TERMS AND PROVISIONS AFFECTED BY THIS MODIFICATION (attach additonal sheets if necessary)

Source & ID No.	Permit Condition	Specify Provisions Which No Longer Apply
New Fly Ash Silo IES-21	Insignificant Activities Attachment to Permit	N/A
Boilers ES-1A, ES-1B	Section 1 and 2.1	Suggested changes to dry sorbent injection system and bagfilters. Please refer to cover letter for details

Upon receipt of the completeness determination letter, you may make the modification in accordance with 15A NCAC 2Q .0515(f). A determination of application completeness by the DAQ is not a determination that each change qualifies as a minor permit modification. It is the responsibility of the applicant to ensure each proposed change meets the criteria of 15A NCAC 2Q .0515. The applicant assumes all financial risks associated with construction and operation without a permit revision. You shall comply with both the applicable requirements governing the change and the proposed permit conditions until final action is taken on the permit application. You need not comply with the existing permit terms and conditions you seek to modify. However, if you fail to comply with the proposed monitoring, the Director may enforce the terms and conditions of the existing permit that you seek to modify. You must certify compliance with the proposed permit terms on the annual compliance certification. The permit shield in 15A NCAC 2Q .0512(a) does not extend to this modification.

FORMs A2, A3

EMISSION SOURCE LISTING FOR THIS APPLICATION - A2

112r APPLICABILITY INFORMATION - A3

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

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

EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	CONTROL DEVICE ID NO.	CONTROL DEVICE DESCRIPTION
Equipment To Be ADDED By This Application (New, Previously Unpermitted, or Replacement)			
IES-21	Fly Ash Silo 2	N/A	N/A
Existing Permitted Equipment To Be MODIFIED By This Application			
ES-1A	Boiler 1A	CD-1C	Common Baghouse (Proposed ID No. CD-1C) - replaces the two existing baghouses
ES-1B	Boiler 1B		
ES-1A	Boiler 1A	CD-1C4	Common dry sorbent injection system (Proposed ID No. CD-1C4) - replaces the two existing dry sorbent injection systems
ES-1B	Boiler 1B		
Equipment To Be DELETED By This Application			

112(r) APPLICABILITY INFORMATION — A 3

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

If No, please specify in detail how your facility avoided applicability: 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, pleas_____

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
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 50% poultry litter and 50% wood, by weight.
See Attachment A for Process Flow Diagram. With this application, the facility is proposing to refurbish the two boilers, replace several control devices, and replace the common stack.

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

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

START CONSTRUCTION DATE:	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? ☑ NSPS (SUBPARTS?): Db	☑ 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)	Refer to emissions calculations						
PARTICULATE MATTER<10 MICRONS (PM_{10})							
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)							
SULFUR DIOXIDE (SO2)							
NITROGEN OXIDES (NOx)							
CARBON MONOXIDE (CO)							
VOLATILE ORGANIC COMPOUNDS (VOC)							
LEAD							
OTHER							

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
Refer to emissions 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
Refer to emissions 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-1C, CD-1A2, CD-1A3, CD-1C4, CD-1B2, CD-1B3
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): 215 MMBtu/hr

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	5,631 Btu/lb	<0.1%	3.6
Wood/Poultry Litter Mix	5,038 Btu/lb	<1%	10.6
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-1C	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 new bagfilter will replace the existing bagfilters (CD-1A, CD-1B), and coupled with the existing multicylone (CD-1A2, CD-1B2) systems, will have a minimum control efficiency of 95% for particulate matter.
The mechanical multi-cyclone dust collector will remain upstream of the new bagfilter to remove larger sized dust particles and char from the flue gas that would otherwise pose as a potential fire hazard to the bagfilter.

POLLUTANTS COLLECTED:	PM/PM10/PM2.5			
BEFORE CONTROL EMISSION RATE (LB/HR):	See Appendix B - Emission Calculations submitted with the 2019 revised PSD permit application.			
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 submitted with the 2019 revised PSD permit application.			

PRESSURE DROP (IN H_20): MIN: MAX: 8 GAUGE? ☑ YES ☐ NO		
BULK PARTICLE DENSITY (LB/FT^3):	INLET TEMPERATURE (^oF): MIN 300	MAX 500
POLLUTANT LOADING RATE: 4353 ☑ LB/HR ☐ GR/FT^3	OUTLET TEMPERATURE (^oF) MIN 290	MAX 500
INLET AIR FLOW RATE (ACFM): 163,992	FILTER OPERATING TEMP (^oF): 356	
NO. OF COMPARTMENTS: 4	NO. OF BAGS PER COMPARTMENT: 304	LENGTH OF BAG (IN.): 360
NO. OF CARTRIDGES: NA	FILTER SURFACE AREA PER CARTRIDGE (FT^2):	DIAMETER OF BAG (IN.): 6
TOTAL FILTER SURFACE AREA (FT^2): 14,820	AIR TO CLOTH RATIO: 2.92	

DRAFT TYPE: ☑ INDUCED/NEGATIVE ☐ FORCED/POSITIVE FILTER MATERIAL: ☑ WOVEN ☐ FELTED Fiberglass

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 will be inspected annually during plant shutdown.

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-1C4	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) 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_20): _____ MIN _____ MAX Negl.	BULK PARTICLE DENSITY (LB/FT^3) N/A
INLET TEMPERATURE (^oF): 300 MIN 500 MAX	OUTLET TEMPERATURE (^oF): 320 MIN 365 MAX
INLET AIR FLOW RATE (ACFM): 163,992	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) used as the sorbent. There is also a potential to utilize hydrated lime.

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
Refer to emissions calculations			

Expected actual emissions is 90% of the potential emissions based on anticipated equipment utilization

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
Refer to 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	
Refer to emissions calculations							

COMMENTS:

Attach Additional Sheets As Necessary

FORM D4

EXEMPT AND INSIGNIFICANT ACTIVITIES SUMMARY

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 warehouse (Source ID No. IES-16)		15A NCAC 2Q .0503 (8)
14.	Poultry Litter Storage shed (Source ID No. IES-20)		15A NCAC 2Q .0503 (8)
15.	Fly Ash Silo 2 (Source ID No. IES-21)		15A NCAC 2Q .0503 (8)
16.			
17.			

Attach Additional Sheets As Necessary

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, Frank J. Burbach, III *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: Frank J. Burbach, III

DATE: 6/17/2021

COMPANY: Advanced Geoservices Engineering and Geology, PC

ADDRESS: 1055 Andrew Drive, Suite A, West Chester, PA 19380

TELEPHONE: 404.861.1195

SIGNATURE:

PAGES CERTIFIED: Forms A, A1, A2, A3, B, B1, C1, C9, D1, D4, D5, E1, E2 E4, E5, Attached Figures, Attached Emissions Estimates, Narrative, Cover Letter

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

PLACE NORTH CAROLINA SEAL HERE

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, ES-1B	Boilers 1A and 1B	40 CFR 63 Subpart JJJJJJ

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***
N/A	N/A	N/A

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, SB3
			SO2	NCAC 02D .0516, NCAC 02Q .0317, NCAC 02Q .0402, SB3, 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC
			Visible Emissions	NCAC 02D .0524
			CO	NCAC 02D .0530, NCAC 02Q .0317
			Sulfuric Acid Mist	NCAC 02D .0530
			HAPs	NCAC 02D .1111, NCAC 02Q .0317
			NOx	NCAC 02Q .0317, NCAC 02Q .0402, 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC, SB3
			VOC	SB3
			Mercury	SB3
			Odors	NCAC 02D .1806

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 has been exceeded in accordance with Special Order by Consent SOC 2017-001.

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

PSD permit application has been submitted in March 2017 and is under review by NC DEQ. Please note that following the submittal of this application, we will prepare and submit a revised PSD permit application to reflect the changes mentioned above.

D. Detailed Schedule of Compliance:

Step(s)	Date Expected

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)

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

SITE NAME: North Carolina Renewal Power - Lumberton, LLC

SITE ADDRESS: 1866 Hestertown Road

CITY, NC : Lumberton, NC 28358

COUNTY: Robeson

PERMIT NUMBER : 05543T27

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.

Date: _____

Signature of responsible company official (REQUIRED, USE BLUE INK)

Carey Davis, Executive Vice President

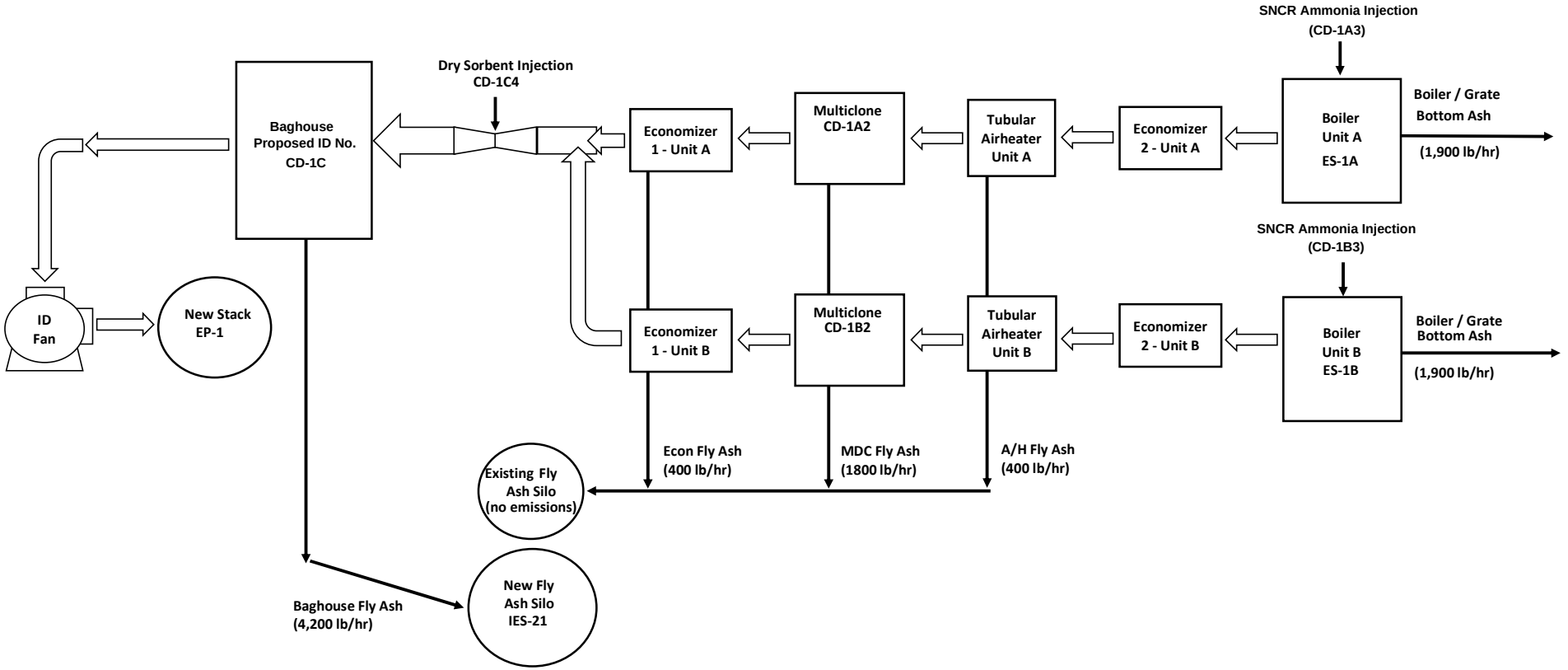
Name, Title of responsible company official (Type or print)

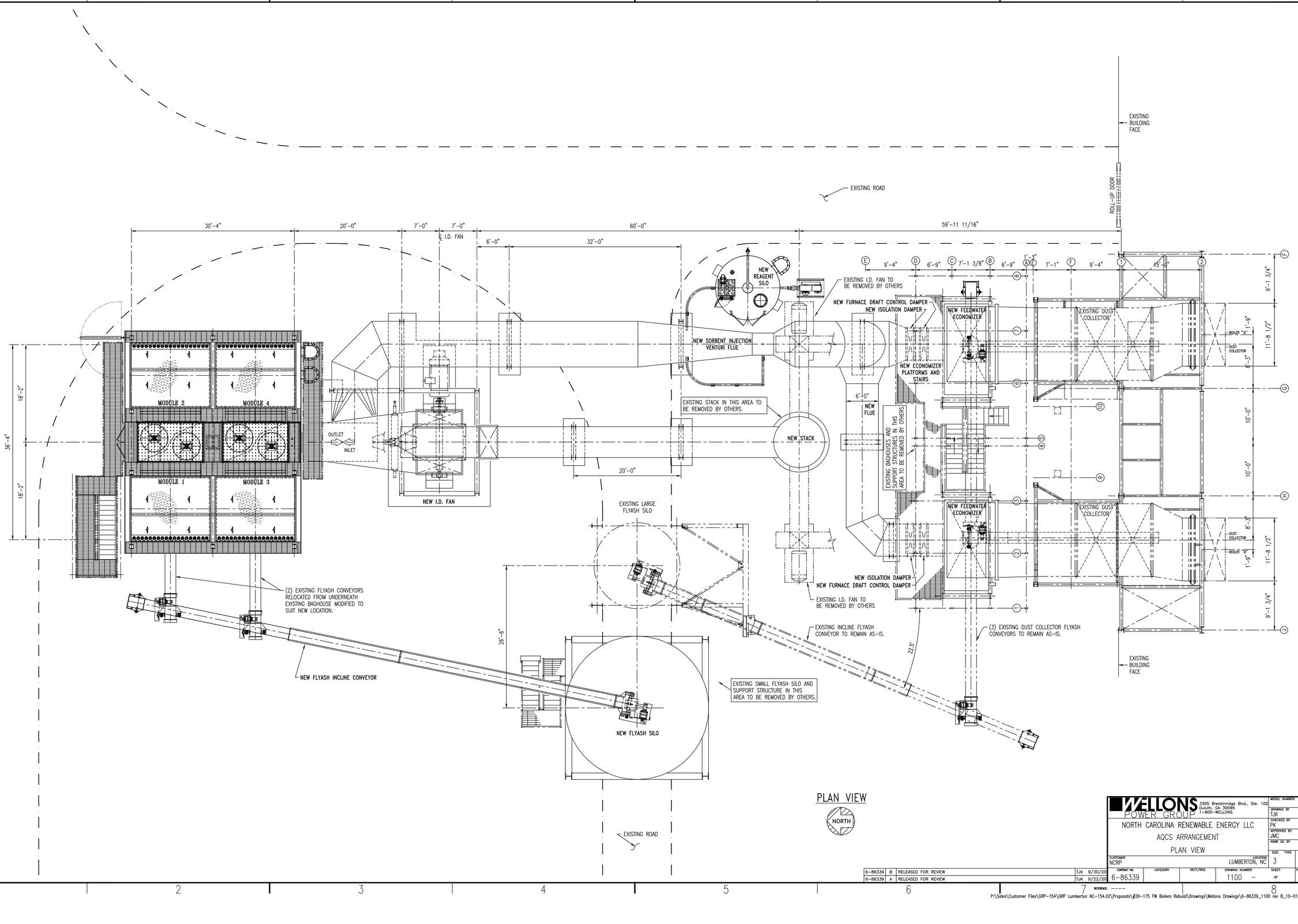
Attach Additional Sheets As Necessary

APPENDIX B
Figures

Ash Handling Process Diagram

Lumberton NC Power Plant





PLAN VIEW

6-86339	B	RELEASED FOR REVIEW	TJK	9/30/20
6-86339	A	RELEASED FOR REVIEW	TJK	9/22/20

WELLONS POWER GROUP
3305 Breckinridge Blvd., Ste. 102
Duluth, GA 30096
1-800-WELLONS

NORTH CAROLINA RENEWABLE ENERGY LLC
AQCS ARRANGEMENT
PLAN VIEW

CUSTOMER NCRP				LOCATION LUMBERTON, NC		SIZE 3	TYPE
CONTRACT NO. 6-86339	CATEGORY	SECT/REG	DRAWING NUMBER 1100	–	SHEET OF	PLATE REV	PART REV B

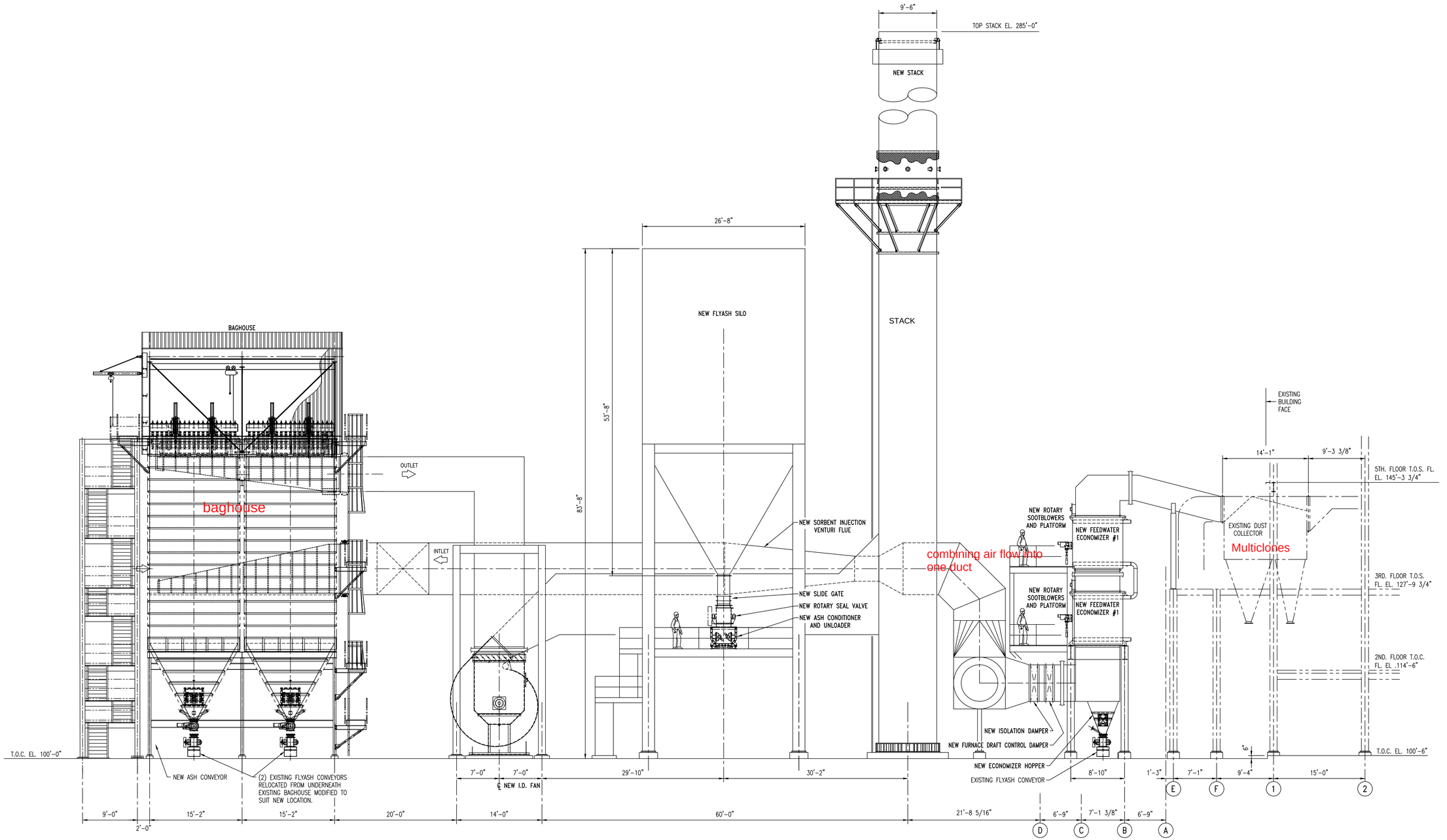
MODEL NUMBER

DRAWING BY TJK	DATE: MM/DD/YYYY 8/25/20
CHECKED BY PK	8/25/20
APPROVED BY JMC	8/30/20
ASME QC BY	

MARK

REFERENCE: ----

P:\Sales\Customer Files\GRP-154\GRP Lumberton NC-154.02\Proposals\220-175 FW Boilers Rebuild\Drawings\Wellons Drawings\6-86339_1100 rev B_10-01-20 plan view.dwg



SIDE VIEW

6-86339	B	RELEASED FOR REVIEW	TJK 9/30/20
6-86339	A	RELEASED FOR REVIEW	TJK 9/22/20

WELLONS POWER GROUP
3305 Breckinridge Blvd., Ste. 102
Duluth, GA 30096
1-800-WELLONS

NORTH CAROLINA RENEWABLE ENERGY LLC
AQCS ARRANGEMENT
SIDE VIEW

MODEL NUMBER	
DRAWING BY	TJK
DATE: MM/DD/YYYY	8/25/20
CHECKED BY	PK
	8/25/20
APPROVED BY	JMC
	8/30/20
ASME QC BY	
CUSTOMER	NCRP
LOCATION	LUMBERTON, NC
SIZE	3
TYPE	
MARK	
CONTRACT NO.	6-86339
CATEGORY	
SECT/REQ	
DRAWING NUMBER	1101 -
SHEET	OF
PLATE REV	
PART REV	B
REFERENCE:	----

P:\Sales\Customer Files\GRP-154\GRP Lumberton NC-154.02\Proposals\#20-175 FW Boilers Rebuild\Drawings\Wellons Drawings\6-86339_1101 rev B_10-01-20 side view.dwg

APPENDIX C
Emissions Estimates

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)	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)	Poultry Litter Warehouse (IES-16)	Belt Dryers (ES-17, ES-18, ES-19, ES-21)	Fly Ash Silo 1 (IES-21)	Fly Ash Silo 2 (IES-22)	Fly Ash Drying Operations
CO	279.50	15.36	1.95	2.77	-	-	-	-	-	-	-	-	-	-	-	-	-
NOx	73.10	73.71	2.25	3.29	-	-	-	-	-	-	-	-	-	-	-	-	-
SO2	68.80	0.65	0.70	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
PM	12.90	10.14	0.11	1.39	-	0.34	0.04	0.04	0.99	0.39	0.34	0.18	0.88	-	Negligible	0.00003	42.88
PM10	15.48	10.14	0.11	1.39	-	0.34	0.02	0.02	0.50	0.18	0.04	0.10	0.00	-	Negligible	0.00001	16.87
PM2.5	11.61	10.14	0.11	1.39	-	0.34	0.00	0.00	0.07	0.03	0.01	0.01	0.00	-	Negligible	0.00000	4.61
VOC	12.90	0.61	0.21	3.30	0.80	-	-	-	-	-	-	-	-	77.35	-	-	-
Lead	1.23E-02	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Highest Individual HAP (HCl)	2.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HAP	4.29	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)	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)	Poultry Litter Warehouse (IES-16)	Belt Dryers (ES-17, ES-18, ES-19, ES-21)	Fly Ash Drying Operations	Fly Ash Silo 1 (IES-21)	Fly Ash Silo 2 (IES-22)	Facility-Wide
CO	1,224.21	6.73	0.49	12.12	-	-	-	-	-	-	-	-	-	-	-	-		1,243.54
NOx	320.18	32.29	0.56	14.43	-	-	-	-	-	-	-	-	-	-	-	-		367.46
SO2	301.34	0.29	0.17	0.17	-	-	-	-	-	-	-	-	-	-	-	-		301.98
PM	56.50	4.44	0.03	6.07	-	1.48	0.10	0.10	4.34	1.71	1.11	0.00	0.08	-	35.28	Negligible	1.18E-04	111.23
PM10	67.80	4.44	0.03	6.07	-	1.48	0.05	0.05	2.17	0.81	0.15	0.00	0.01	-	14.30	Negligible	5.59E-05	97.35
PM2.5	50.85	4.44	0.03	6.07	-	1.48	0.01	0.01	0.33	0.12	0.02	0.00	0.01	-	4.16	Negligible	5.59E-06	67.51
VOC	56.50	0.27	0.21	14.45	0.80	-	-	-	-	-	-	-	-	293.09	-	-	-	365.33
Lead	0.05	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
Highest Individual HAP (HCl)	10.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.00
Total HAP	16.32	0.19	0.00	0.62	-	-	-	-	-	-	-	-	-	-	-	-	-	17.14

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/Poultry Litter/Poultry Cake Mix Combustion (Expected mix: 15% wood, 85% poultry litter and cake)

		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	0.65	279.50	1,224.2	Same as post-control emissions	Good Combustion	N/A	0.65	279.50	1,224.2	Based on BACT CO limit of 0.65 lb/MMBtu (when burning wood/litter and cake mix)
Criteria Pollutant	NOx	0.28	121.83	533.6	Back calculated from post-combustion lb/MMBtu emission factor and control efficieny	SNCR	40%	0.17	73.10	320.2	Based on proposed SB3 BACT NOx limit of 0.17 lb/MMBtu (when burning wood/litter and cake 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 and Cake Mix	80%	0.16	68.80	301.3	Based on BACT SO2 limit of 80% Reduction (when burning wood/litter and cake 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, litter and cake.
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 and Cake ("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 and cake being fired in the boiler.

Emission Factors of HAPs and Air Toxics From Wood and Poultry Litter and Cake 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 Kenansville is a sister facility

Poultry Litter and Cake and Wood Biomass Combined

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

Metal HAP Baghouse Control Efficiency: 80%
(not used for Hg)

	Poultry Litter and Cake + 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 and Cake + 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	0.00663	Vendor Guarantee. Use of low chlorine content wood.	2.85E+00	10.00	Not used. NESHAP limit used instead.									0.0063	MACT avoidance	2.71	10.00	Biomass	2.85	10.00
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	0.0000946	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

Emission Factors of HAPs and Air Toxics From Wood and Poultry Litter and Cake 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 Kenansville is a sister facility

Poultry Litter and Cake and Wood Biomass Combined

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

Metal HAP Baghouse Control Efficiency: 80%
(not used for Hg)

	Poultry Litter and Cake + 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 and Cake + 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)**
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	1.58E-06	AP-42 Chapter 1.6 & Baghouse Control Efficiency	6.79E-04	0.003														Biomass	6.79E-04	0.003
Metal HAP	Arsenic	7440-38-2	4.40E-06	AP-42 Chapter 1.6 & Baghouse Control Efficiency	1.89E-03	0.008		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	2.20E-07	AP-42 Chapter 1.6 & Baghouse Control Efficiency	9.46E-05	4.14E-04		1.60E-04	8.60E-07							8.60E-07	Max emission rate from CC stack tests.	0.00	0.00	Poultry Litter + Biomass	3.70E-04	0.002
Metal HAP	Cadmium	7440-43-9	8.20E-07	AP-42 Chapter 1.6 & Baghouse Control Efficiency	3.53E-04	0.002		4.24E-04	2.28E-06							2.28E-06	Max emission rate from CC stack tests.	0.00	0.00	Poultry Litter + Biomass	9.80E-04	0.004
Metal HAP	Chromium (Total)	7440-47-3	4.20E-06	AP-42 Chapter 1.6 & Baghouse Control Efficiency	1.81E-03	0.008		2.14E-03	1.15E-05							1.15E-05	Max emission rate from CC stack tests.	0.00	0.02	Poultry Litter + Biomass	4.95E-03	0.02
Metal HAP	Chromium (Hexavalent)	18540-29-9	7.00E-07	AP-42 Chapter 1.6 & Baghouse Control Efficiency	3.01E-04	0.001														Biomass	3.01E-04	0.001
Metal HAP	Cobalt	7440-48-4	1.30E-06	AP-42 Chapter 1.6 & Baghouse Control Efficiency	5.59E-04	0.002														Biomass	5.59E-04	0.002
Metal HAP	Lead	7439-92-1	9.60E-06	AP-42 Chapter 1.6 & Baghouse Control Efficiency	4.13E-03	0.02	2.86E-05	5.32E-03	2.86E-05							2.86E-05	Max emission rate from CC stack tests.	0.01	0.05	Poultry Litter + Biomass	1.23E-02	0.05
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	6.60E-06	AP-42 Chapter 1.6 & Baghouse Control Efficiency	2.84E-03	0.01		3.16E-03	1.70E-05							1.70E-05	Max emission rate from CC stack tests.	0.01	0.03	Poultry Litter + Biomass	7.31E-03	0.03
Metal HAP	Selenium	7782-49-2	5.60E-07	AP-42 Chapter 1.6 & Baghouse Control Efficiency	2.41E-04	0.001	2.41E-07	2.15E-03	2.41E-07							2.41E-07	Max emission rate from CC stack tests.	0.00	0.00	Biomass	2.41E-04	0.001
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

Emission Factors of HAPs and Air Toxics From Wood and Poultry Litter and Cake 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.
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Poultry Litter and Cake and Wood Biomass Combined

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

Metal HAP Baghouse Control Efficiency: 80%
(not used for Hg)

	Poultry Litter and Cake + 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 and Cake + 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)**
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
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		9.99E-03		4.29E+00	16.32													10.48	Biomass	4.29E+00	16.32
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																		

Emission Factors of HAPs and Air Toxics From Wood and Poultry Litter and Cake 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 Kenansville is a sister facility

Poultry Litter and Cake and Wood Biomass Combined

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

Metal HAP Baghouse Control Efficiency: 80%
(not used for Hg)

	Poultry Litter and Cake + 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 and Cake + 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	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	Isobutylraldehyde	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
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

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(not used for Hg)

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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)**
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 and cake/wood mix. Therefore, wood only combustion factor used.

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

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)

Fly Ash Silo 2 (IES-22) 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)
IES-22 - Fly Ash Silo 1	0.63	0.005	2.70E-05	1.28E-05	1.28E-06	1.18E-04	5.59E-05	5.59E-06

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 rate (acfm) = 4,200 lb/hr baghouse fly ash X ft3/111.12 lb X hr/60 min = 0.63 acfm
Estimated dry density of fly ash = 1.01 to 1.78 g/cm3. Using 1.78 g/cm3 = 111.12 lb/ft3
Reference for dry density of fly ash - "Physical, chemical, and geotechnical properties of coal fly ash: A global review"

[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)

Belt Dryer Potential Emissions (ES-17, ES-18, ES-19, ES-21)

VOC and HAP Emission factors to calculate emissions from belt dryers taken from the from the Compliance Air Emissions Test Report (dated Oct 10, 2018)

Belt Dryer Stack Test - Operating Data

	Lbs.	Cu/Ft	Feet	Lbs. / Hr.	Tons / Hr.
Dryer Bed width			21		
A. Dryer Bed Depth stack 1			0.25		
B. Dryer Bed Depth stacks 2,3,4			0.375		
800 RPM belt speed @ min			4.72		
A. Wood Chips	718.6	24.78		43,117.2	21.6
B. Wood Chips	1,077.9	37.17		64,675.8	32.3
Wet Wood Chip weight / cu/ft	29				

VOC Emission Results from Oct 2018 Stack Test

Stack Number	1	3	6	8	Total (for 8 stacks)	
VOC Emission Rates (lb/hr)	2.20	2.27	2.54	2.31		
Feed Rate (ton/hr)	21.6	32.3	32.3	32.3		
VOC Emission Factor (lb/ton)	0.102	0.070	0.079	0.072		
Estimated VOC Emission Rate (lb/hr) @ 30 ton/hr Feed Rate	3.056	2.108	2.359	2.146	19.3	lb/hr

Potential Annual Emissions (lb/hr) =	77.3	lb/hr	(ES-17, ES-18, ES-19, ES-22)
Potential VOC Emissions =	84.7	tons/yr	(per belt dryer)
Potential VOC emissions from 3 belt dryers =	254.1	tons/yr	(ES-17, ES-18, ES-19)

Notes:
1) Each belt dryer has eight stacks, and NC DAQ allowed testing of only four stacks. The test results were then doubled to represent emissions from the entire belt dryer.
2) Annual emissions were based on operation of 8,760 hours oer year.

The facility will be taking a 39 tpy VOC limit for the 4th belt dryer ES-21

Estimated potential VOC emissions from all 4 belt dryers = 293.1 tpy
(254.1 tpy VOC from ES-17, 18, 19 + 39 tpy VOC from ES-21)

Formaldehyde emissions rates for modeling: 1.04 lb/hr (From 4 belt dryers)

(Note that formaldehyde was not detected during the 2018 belt dryer stack test. However, for modeling purposes, they are assumed to be emitted at the detection limit for the pollutant) 4.56 tons/yr

Notes:
HAPs were non-detect during stack test.
Estimated total pollutant emission rate (tpy) = Emissions (lb/hr) X 8760 hr/yr / 2000 lb/ton

Fly Ash Drying Operations

Truck Filling & Unloading

Data Inputs		Reference
Max Hourly Throughput:	1.5 ton/hr	Capacity of pug mill
Potential annual usage:	13,140 ton/yr	Scaled up short-term usage to potential based on 8,760 hr/yr
Number of Drops:	2	Drop into truck and drop onto ground
$Emission\ Factor\ (\frac{lb}{ton}) = k(0.0032)\frac{(\frac{U}{5})^{1.3}}{(\frac{M}{2})^{1.4}}$		US EPA AP-42, Chapter 13.2.4, Equation 1.
k, particle size multiplier:	0.74 (PM) 0.35 (PM_{10}) 0.053 ($PM_{2.5}$)	US EPA AP-42, Chapter 13.2.4
U, mean wind speed:	6.24 mph	NOAA wind speed data for 2018.
M, material moisture content:	4.8%	US EPA AP-42, Chapter 13.2.4. The actual moisture content will range between 10 and 30 percent; however, the maximum of the range provided for use in Equation 1 was conservatively used.

Emission Calculations	Emission Factor		Usage		Drops		Conversion		Annual Emissions
PM	9.27E-04 lb/ton	×	13,140 ton/yr	×	2 drops	÷	2000 lb/ton	=	**1.22E-02 ton/yr**
PM_{10}	4.38E-04 lb/ton	×	13,140 ton/yr	×	2 drops	÷	2000 lb/ton	=	**5.76E-03 ton/yr**
$PM_{2.5}$	6.64E-05 lb/ton	×	13,140 ton/yr	×	2 drops	÷	2000 lb/ton	=	**8.72E-04 ton/yr**

Wind Erosion

Data Inputs		Reference
Average Pile Size:	0.045 acres	Estimate
$Emission\ Factor\left(\frac{lb}{(day)(acre)}\right) = 1.7\left(\frac{s}{1.5}\right)\left(\frac{365-p}{235}\right)\left(\frac{f}{15}\right)$		Air & Waste Management Association's Air Pollution Engineering Manual (1992), Chapter 4, Equation 5.
s, silt content of material:	81 %	US EPA AP-42, Chapter 13.2.4, Table 13.2.4-1, mean value.
p, number of days with >0.01 in. precipitation per year:	110 days	US EPA AP-42, Chapter 13.2.2, Figure 13.2.2-1.
f, percentage of time wind speed >12 mph at the mean pile height:	87 %	NOAA wind speed data for 2018.
k, particle size multiplier:	1 (PM) 0.5 (PM_{10}) 0.2 ($PM_{2.5}$)	US EPA AP-42, Chapter 13.2.4.

Emission Calculations	Emission Factor		Usage		Surface Area		Conversion		Annual Emissions
PM	578.6 lb/(day)(acre)	×	365 days	×	0.05 acres	÷	2000 lb/ton	=	**4.76 ton/yr**
PM_{10}	289.3 lb/(day)(acre)	×	365 days	×	0.05 acres	÷	2000 lb/ton	=	**2.38 ton/yr**
$PM_{2.5}$	115.7 lb/(day)(acre)	×	365 days	×	0.05 acres	÷	2000 lb/ton	=	**0.95 ton/yr**

Bulldozing/Truck Loading

Data Inputs		Reference
Loading Time:	0.75 hr	Estimate - loading one truck takes 30-45 minutes.
Shipments per Year:	1,460 shipments	Estimate - 2 to 4 shipments daily. Scaled up to 365 days per year.
$PM\ Emission\ Factor\left(\frac{lb}{hr}\right) = \frac{5.7(s)^{1.2}}{(M)^{1.3}}$		US EPA AP-42, Chapter 11.9, Table 11.9-1.
$PM_{15}\ Emission\ Factor\left(\frac{lb}{hr}\right) = \frac{1.0(s)^{1.5}}{(M)^{1.4}}$		US EPA AP-42, Chapter 11.9, Table 11.9-1.
s, silt content of material:	81 %	US EPA AP-42, Chapter 13.2.4, Table 13.2.4-1, mean value.
M, moisture content:	10 %	Desired moisture content.
Scaling Factors (applied to PM_{15}):	0.75 (PM_{10}) 0.105 ($PM_{2.5}$)	US EPA AP-42, Chapter 11.9, Table 11.9-1.

Emission Calculations	Emission Factor		Loading Time		Conversion		Annual Emissions
PM	55.7 lb/hr	×	1,095 hr/yr	÷	2000 lb/ton	=	**30.51 ton/yr**
PM_{10}	21.8 lb/hr	×	1,095 hr/yr	÷	2000 lb/ton	=	**11.92 ton/yr**
$PM_{2.5}$	5.9 lb/hr	×	1,095 hr/yr	÷	2000 lb/ton	=	**3.20 ton/yr**

Fly Ash Drying Operations

Truck Filling & Unloading

Total Emissions

Criteria Pollutants	Hourly PTE (lb/hr)	Annual PTE (tpy)
PM	42.9	35.3
PM_{10}	16.9	14.3
$PM_{2.5}$	4.6	4.2

HAP	Weight Fraction	Hourly PTE (lb/hr)	Annual PTE (tpy)
Antimony	2E-09	8.58E-08	7.06E-08
Arsenic	8.5E-08	3.65E-06	3.00E-06
Beryllium	1E-10	4.29E-09	3.53E-09
Cadmium	1.9E-10	8.15E-09	6.70E-09
Chromium	1E-09	4.29E-08	3.53E-08
Lead	4E-09	1.72E-07	1.41E-07
Manganese	2.48E-07	1.06E-05	8.75E-06
Nickel	7E-09	3.00E-07	2.47E-07
Selenium	8E-09	3.43E-07	2.82E-07
Total HAP	3.55E-07	1.52E-05	1.25E-05

Poultry Litter Storage Warehouse (IES-16) 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)
1	U - Average Wind Speed (mph)	Estimated as wind speed inside warehouse
23.85	M - Poultry Litter Moisture Content (%)	Lowest estimated poultry litter moisture content
44.76	Maximum Hourly Production Rate (tons/hr)	Taken from poultry litter sampling data from 2012
392,087	Maximum Annual Production Rate (TPY)	Taken from poultry litter sampling data from 2012

Material Handling Emissions:

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]	Controlled Annual PM Emissions (TPY)[3]	Hourly PM_{10} Emissions (lb/hr)[2]	Controlled Annual PM_{10} Emissions (TPY)[3]	Hourly $PM_{2.5}$ Emissions (lb/hr)[2]	Controlled Annual $PM_{2.5}$ Emissions $(TPY)_3$
IES-16	Transfer Point - Truck Dumps on Ground	44.8	392,087	9.09E-06	4.30E-06	6.36E-07	4.07E-04	1.78E-03	1.92E-04	8.43E-04	2.85E-05	1.25E-04
IES-16	Transfer Point - Existing Cogar Reclaimer moves litter from ground to Belt Conveyor C-1D	44.8	392,087	9.09E-06	4.30E-06	6.36E-07	4.07E-04	1.78E-03	1.92E-04	8.43E-04	2.85E-05	1.25E-04
IES-16	Transfer Point - Belt Conveyor to Disc Screen	44.8	392,087	9.09E-06	4.30E-06	6.36E-07	4.07E-04	1.78E-03	1.92E-04	8.43E-04	2.85E-05	1.25E-04
IES-16	Transfer Point - Disc Screen to Conveyor	44.8	392,087	9.09E-06	4.30E-06	6.36E-07	4.07E-04	1.78E-03	1.92E-04	8.43E-04	2.85E-05	1.25E-04
	Transfer Point - Conveyor to Boiler House Fuel Bin	44.8	392,087	9.09E-06	4.30E-06	6.36E-07	4.07E-04	1.78E-03	1.92E-04	8.43E-04	2.85E-05	1.25E-04
						Total	0.002	0.009	0.001	0.004	0.000	0.001

[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 $PM_{2.5}$)

Maximum Hourly Production Rate (tons/hr) = (430 MMBtu/hr*10^6 Btu/MMBtu*85%) /(4083 Btu/lb*2000 lb/ton) = 44.76 tons/hr

Conservatively estimated poultry litter burning capacity to be 85% of boiler capacity

Poultry Litter Storage Warehouse (IES-16) Potential Emission Calculations

Emissions from Wind Erosions:

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)
IES-16	Poultry Litter Storage Pile	0.75	340	100	25	3926.48	0.860	0.00	0.000	0.00	0.000	0.00
						Total	**0.86**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Calculated Emission Factors[2,3]

PM (g/m2-day)	PM10 (g/m2-day)	PM2.5 (g/m2-day)
0.00	0.00	0.00

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"

$EF = 1.9 \times (s/15) \times ((365-p)/235) \times (f/15)$ (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 = 00 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

Poultry Litter Storage Warehouse (IES-16) Potential Emission Calculations
Emissions from Front-End Loader/Dozer Operations

Material Silt Content (s) [1]	1.6	%
Material Moisture Content (M)	23.85	%
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) = $(1.0*(s)^{1.5})/(M)^{1.4}$

Emission Source ID No.	Source Description	Emission Factor, EF (lb/hr/dozer)			PM (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	Controlled PM (tpy)	Controlled PM_{10} (tpy)	Controlled $PM_{2.5}$ (tpy)
		PM	PM_{10}	$PM_{2.5}$						
IES-16	Front-End Loader/Dozer Operations	0.16	0.02	0.02	0.02	0.00	0.00	0.07	0.01	0.01

[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

Poultry Litter Storage Warehouse (IES-16) Potential Emission Calculations

Emissions of NO_x			
N2O flux rates for land application of poultry and swine manure	61.3 to 184	mg NOx/m2-d	The range is for the entire year. The highest end of the range was used as a conservative estimate.
	3.80E-05	lb NOx/ft2-day	Iowa State University (2006)[1]
Area of poultry litter warehouse	100 ft by 200 ft		Conservative estimate of size of warehouse/poultry litter shed.
	20,000	ft2	
Hours of operation	365	days/yr	--
N2O emissions	E = 3.8E-5 lb NO_x/ft^2-yr * 20,000 ft^2 * 365 days		
	277.40	lb/yr NOx	
	0.14	tons/yr NOx	
	0.03	lb/hr	
Emissions of NH3			
NH3 flux rates from storage of poultry litter	4.2 to 9.1	g NH/m2-d	Typically, the higher end of the range would be used to provide a conservative estimate. However, the poultry litter delivered to the site has been dried and screened. It has been observed to be similar to wood chips and has very little detectible odor. For this reason, the lower end of the range is a better representation of expected ammonia emissions.
	6.40E-04	lb NH3/ft2-d	Iowa State University (2006)
Area of poultry litter warehouse	100 ft by 200 ft		Conservative estimate of size of warehouse/poultry litter shed.
	20,000	ft2	
Hours of operation	24	hrs/day	--
NH3 emissions	E = 6.4E-4 lb $NH3/ft^2$-d * 20,000 ft^2 / 24 hr/day		
	0.53	lb/hr	
	2.34	tpy	

[1] Air Quality and Emissions from Livestock and Poultry Production / Waste Management Systems. (2006) Retrieved from http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1624&context=abe_eng_pubs

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.

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.

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.

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)

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.

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 firing 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

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

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
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 $PM_{2.5}$)

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

Fuel Material Handling - Emission Estimates

Source ID N IES-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 ≤ 30 um) [3]
EF_{PM} (lb/hr/dozer) = $(5.7*(s)^{1.2})/(M)^{1.3}$

≤ 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 (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
		PM	PM_{10}	$PM_{2.5}$						
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

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)			Emissions					
					PM	PM_{10}	$PM_{2.5}$	PM		PM_{10}		$PM_{2.5}$	
								(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(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


NCRP
Segment C
Segment B
Segment A

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