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Trinity Consultants

November 25, 2019

Ms. Megan Rupp
Mississippi Department of Environmental Quality (MDEQ)
Attn: Environmental Permits Division
P.O. Box 2261
Jackson, MS 39225

*RE: Pinnacle Renewable Energy, Inc. – Newton Pellet Plant Greenfield Permit Application*
*Additional Information Provided in Response to MDEQ Deficiency Letter*

Dear Ms. Rupp:

Pinnacle Renewable Energy, Inc. (Pinnacle) submitted an air permit application to the Mississippi Department of Environmental Quality (MDEQ) to construct a greenfield pellet plant in Newton, Newton County, Mississippi in September 2019. In a letter dated November 14, 2019,[1] MDEQ requested modifications to the aforementioned permit application and also requested additional clarifications for processing the application and developing an air permit. On behalf of Pinnacle, Trinity Consultants (Trinity) is submitting this letter and associated attachments in response to the letter to satisfy MDEQ's additional information request. Included in this submittal is a written response contained within the letter narrative to MDEQ's request for additional clarifications, the November 14, 2019 MDEQ letter for reference (Attachment 1), and the updated application (Attachment 2).

## ADDITIONAL APPLICATION INFORMATION

Included in this section is the additional information requested by MDEQ in list format. This section is organized with MDEQ's request in ***bold italics***, and Pinnacle's response immediately following in normal text.

1.) ***An electronic copy of the revised application was received via email on October 30, 2019. However, a hard copy of the revised application has not yet been received by MDEQ. Please submit a hard copy to be placed in our public records files.***

    As part of this response letter and follow-up to MDEQ, Pinnacle has made additional updates to the application pages. The updates are not substantial and do not affect applicability determinations with any federal or state air quality regulations. Nonetheless, Pinnacle will provide an updated electronic application (Attachment 2) and will also provide an updated final hard copy to MDEQ with signatures.

2.) ***If Pinnacle plans to disturb 5 acres or more of land during construction of the facility, then Pinnacle must apply for coverage under the Large Construction Storm Water General NPDES Permit.***

[1] Letter from Ms. Megan Rupp (MDEQ) to Mr. Paul Pawlowski (Pinnacle) dated November 14, 2019. See Attachment 1.

Pinnacle plans to disturb more than 5 acres of land and will submit an application for coverage under the Large Construction Storm Water General NPDES Permit. Pinnacle is working to develop this application and will submit as soon as practicable.

3.) ***Under Section 2.2.2 of the application, it states: "The dryer system and energy system will have an abort stack which will be closed and only used during periods of emergency or malfunction." Will the dryer vent to the abort stack during periods of start-up, shutdown, and/or idle time, too? If so, the emissions calculations from the abort stack should be included in the application, along with an estimated time for these events.***

There are 2 separate abort stacks, the furnace abort and the dryer abort. The dryer abort stack is only used in case of a spark detect. Therefore, dryer abort stack emissions are only during instances of malfunction. Pinnacle believes that emissions resulting from malfunctions do not need to be quantified in the potential emissions calculations as these are unforeseeable events and are difficult to quantify. Please note that abort conditions due to emergency are very rare.

The furnace abort stack could be used for startup and shutdown events during which time the dryer burner will be operating at a low idle mode (approximately 10% heat input load capacity) and process material will not be passing through the dryer. As the bulk of the volatile organic compound (VOC) emissions, particulate matter (PM) emissions, and hazardous air pollutant (HAP) emissions, which are the controlled emissions from the Wet Electrostatic Precipitator (WESP) and regenerative thermal oxidizer (RTO), are process-related emissions specific to the wood material being dried, Pinnacle believes that the most conservative emissions profile is to assume continuous (8,760 hr/yr) operation at the maximum heat input capacity (MMBtu/hr) and process throughput (oven-dried tons/hr) as currently represented in the application. Although the furnace abort stack will by-pass the control devices, the only emissions that will be emitted are the combustion emissions at approximately 10% operating capacity. Additionally, Pinnacle operates other facilities and startup/shutdown emissions have never been represented as part of the facility-wide potential to emit. Pinnacle proposes to track and report any time that the abort stacks are used.

4.) ***Please elaborate on the design of the step grate furnace burner for the dryer. Does the furnace burner vent to a separate stack? Also, does the furnace burner vent to its own abort stack, separate from the dryer abort stack? If so, then emissions from the furnace abort stack should be quantified.***

As discussed in No. 3, there are two (2) separate abort stacks, the furnace abort and the dryer abort. The furnace burner gases are all fired into the dryer drum and then to the WESP and RTO1, unless there is an abort condition. The furnace abort stack may be used up to 20 times per year for 12 hours at a time with the furnace idling (approximately 10% of capacity). Additionally, the furnace abort stack may be used up to three (3) times per year for 3 hours at a time during cold starts. Abort stack usage occurs at minimal firing rates, and there are no process emissions during abort stack usage. The only emissions from abort stack usage are from wood residue combustion. Potential emissions from combustion will be the worst-case during normal operations at maximum firing rate.

5.) ***Fugitive emissions from the wood chipper and debarker have been excluded from the PSD applicability determination. However, similar wood pellet manufacturing facilities have included those emissions in their PSD applicability determination. MDEQ requests that Pinnacle either include the fugitive emissions from the wood chipper and debarker in the PSD applicability determination or provide a reasonable explanation as to why these should be excluded.***

Pursuant to requirements located in 40 CFR Part 52.21(b)(1)(iii), the fugitive emissions of a stationary source shall not be included in determining applicability to Prevention of Significant Deterioration (PSD), unless the source is one of the specifically listed 28 source categories. As indicated in application Section 3.5 on page 3-4, fugitive emissions are excluded because the wood pellet production operation is not on the PSD List of 28 categories with a lower major source threshold (100 tpy), which requires subject source categories to include fugitive emissions for permitting applicability determinations.

Pinnacle will take all necessary precautions to ensure that fugitive dust and VOC are minimized at the Newton facility.

***6.) Several emission factors in the application are given in units of lb/ton. Please specify if these factors are expressed in oven dried tons (ODT).***

Emission factors provided in units of lb/ton have been updated to specify the basis of measure (wet basis or oven dry basis), please see the updated application (Attachment 2).

***7.) Based on the application and the process diagram, it appears the VOC emissions from the dry hammermills will not be controlled. The only control device associated with these units is the baghouse used for particulate matter control. Please confirm that there is no VOC control on the dry hammermills.***

This is correct as stated, exhaust from the dry hammermills will be routed to a baghouse for PM control only. There will not be any VOC control on this process.

***8.) Under Table B-10: Potential VOC Emissions from the Dry Hammermills, Note 2 states that the VOC emission factor used for the calculations is from a 2013/2014 engineering test performed on a dry classisizer unit at the Pinnacle Aliceville Facility. Please provide us with a copy of this study and/or information to support this factor being representative of the potential emissions at the Newton facility. Also, please provide an explanation as to what a "classisizer" is and why its emissions would be comparable to the dry hammermills at the Newton, MS facility.***

See Appendix D of the application. October 2018 testing at Pinnacle's Aliceville facility supports that the factors utilized for Newton's dry hammermills are more conservative and representative for use in the potential emissions inventory. The write-up from the application is included below for reference.

- Performance testing on the pellet coolers and dry hammermills baghouse at Pinnacle's Aliceville Pellet Mill in October 2018
  - This report contains emissions obtained on two (2) stacks at Aliceville, RTO2 (which is the RTO/RCO controlling VOC emissions on the pellet cooler lines) and BH1 (the baghouse controlling PM emissions on the dry hammermills at Aliceville).
  - The proposed dry hammermills and pellet coolers at Newton will be similar in controls and in capacity to the units at Aliceville.
  - The factors utilized in the potential emissions inventory for these units do not come from this test report. The factors are from engineering test runs conducted independently at the Aliceville facility as noted in the footnotes in Appendix B. Pinnacle chose to conservatively utilize more conservative emissions factors from engineering testing, which represents the worst-case VOC emissions measured on these units. Additionally, as these factors are from engineering testing, there is no test report that was submitted to the Alabama agency (ADEM). The emissions, as

shown in the included October 2018 test report, are substantially lower than what is represented in Appendix B. Pinnacle submits this report as evidence that the proposed units at Newton will be able to meet the VOC emission limits.

Both a classisizer and a hammermill are very similar in function, they each serve to reduce wood material to the proper size for further processing in the pellet machines. However, there is some difference in the operational methods. A traditional hammermill crushes the wood process material (i.e., dried wood chips) using many little hammers that size the material and pushes this material through a screen. However, a classisizer uses rotary motion that effectively "throws" the material at the screen. Material that is properly sized will pass through, whereas larger material will fall and will be re-thrown again.

***9.) The application does not adequately address condensable particulate matter (PM) emissions. The application states that condensable PM is "negligible," but no supporting calculations were provided to support that statement.***

Condensable particulate matter (CPM) is generally considered a product of combustion and is not generated or emitted due to a mechanical process. Therefore, Pinnacle does not expect CPM emissions from the following processes:

- Debarking/Chipping
- Material handling/Material storage/Material transfer and loadout
- Dry milling
- Pelletizing

The remaining processes are discussed in detail below:

- Dryer
  - Emissions of Total PM, which includes both filterable and condensable components of PM, are guaranteed by the equipment vendor not to exceed the rate listed in Table B-5. Therefore, CPM is already included in this emission rate by default. Pinnacle conservatively assumes that the filterable portion of PM will be as high as the Total PM.
- RTO1 natural gas combustion
  - CPM (and Total PM) emissions are included with the vendor guarantee.
- RTO2 natural gas combustion
  - Emissions of CPM are included in Table B-9.
- Emergency generator engines
  - CPM is included in the Total PM emissions estimates in Table B-18
- Fire pump engine
  - CPM is included in the Total PM emissions estimates in Table B-21

Therefore, Pinnacle believes that CPM has been adequately addressed in the application.

***10.) Emission factors from the vendor were provided in units of lb/hr, however the application does not specify the throughput that was used to derive those factors.***

The lb/hr emission factors provided by the vendor are based on the following:

- Dryer throughput of 440,000 tons per year of dried wood
- The material processed (mostly softwood)
- Experience from the vendor on other pellet plants and dryers of this size and capacity

The "lb/hr" rates represent the maximum mass emission rates for the highest process throughput and maximum heat input capacity for the dryer system. Please note that July 2015 testing at Pinnacle's Aliceville facility also provides justification for the use of these factors (see Appendix D of application).

***11.) Please provide a proposed change-out frequency for the catalyst in the RCO.***

Pinnacle proposes to install a regenerative thermal oxidizer (RTO2) instead of a regenerative catalytic oxidizer (RCO1) to control the exhaust from the wood pelletizing lines. The RTO2 unit will include one (1) burner (maximum heat input capacity of 10.0 MMBtu/hr) that combusts natural gas to oxidize VOC and organic HAP in the exhaust gases to form carbon dioxide ($CO_2$) and water at approximately 1,500° F. The application was updated to reflect this proposed change.

***12.) The application does not address the ratio of softwood to hardwood that will be used at the Pinnacle Facility.***

Greater than 90% of the wood material used at the Newton facility will be softwood.

***13.) Pinnacle is located adjacent to Biewer Sawmill Newton LLC and will receive sawdust, shavings, bark, and wood chips from Biewer. Please verify that Pinnacle is not considered to be under "common control" with the adjacent Biewer facility.***

There are three (3) requirements that must be met in order for the two facilities to be under common control:

1. The sites must be contiguous and adjacent

2. The sites must have the same two-digit Standard Industrial Classification (SIC) code

3. The sites must have common ownership

While the Biewer Sawmill and Pinnacle's Pellet Mill could most certainly meet the requirements for the first two of these items (they are adjacent and they have the same 2-digit SIC code for wood product operations), there is no common ownership between the two entities. Pinnacle does not own any interest in the sawmill and vice versa.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Pinnacle appreciates MDEQ's review and efforts in processing this permit application and looks forward to working with MDEQ on development of the draft permit for the proposed project. Please do not hesitate to contact me at (205) 970-6035 or Paul Pawlowski of Pinnacle at (604) 270-9613, Ext. 2022 to review questions or comments concerning this submittal.

Sincerely,

TRINITY CONSULTANTS

Jeremiah Redman
Manager of Consulting Services

Attachments

cc: Mr. Paul Pawlowski, Pinnacle (Richmond, BC)
Mr. Brad James, Trinity (Atlanta, GA)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

# Attachment 1 – MDEQ Deficiency Letter

November 14, 2019

Mr. Paul Pawlowski
Director – Energy & Environment
Pinnacle Renewable Energy, Inc.
3600 Lysander Lane, Suite 350
Richmond, BC V7B 1C3

Re: Pinnacle Renewable Energy, Inc., Newton MS Facility
Air Application Deficiency
Ref. No.1980-00045
Newton County

Dear Mr. Pawlowski:

Based upon review of the above referenced application received from Pinnacle Renewable Energy, Inc., Newton MS Facility (Pinnacle) on October 30, 2019 the following deficiencies were noted:

1. An electronic copy of the revised application was received via email on October 30, 2019. However, a hard copy of the revised application has not yet been received by MDEQ. Please submit a hard copy to be placed in our public records files.

2. If Pinnacle plans to disturb 5 acres or more of land during construction of the facility, then Pinnacle must apply for coverage under the Large Construction Storm Water General NPDES Permit. The "Large Construction Stormwater Forms Package" may be found at our website: https://www.mdeq.ms.gov. For questions about storm water coverage, please contact Florance Bass at 601-961-5612.

3. Under Section 2.2.2 of the application, it states: "The dryer system and energy system will have an abort stack which will be closed and only used during periods of emergency or malfunction." Will the dryer vent to the abort stack during periods of start-up, shutdown, and/or idle time, too? If so, the emissions calculations from the abort stack should be included in the application, along with an estimated time for these events.

4. Please elaborate on the design of the step grate furnace burner for the dryer. Does the furnace burner vent to a separate stack? Also, does the furnace burner vent to its own abort stack, separate from the dryer abort stack? If so, then emissions from the furnace abort stack should be quantified.

5. Fugitive emissions from the wood chipper and debarker have been excluded from the PSD applicability determination. However, similar wood pellet manufacturing facilities have included those emissions in their PSD applicability determination. MDEQ requests that Pinnacle either include the fugitive emissions from the wood chipper and debarker in the PSD applicability determination or provide a reasonable explanation as to why these should be excluded.

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6. Several emission factors in the application are given in units of lb/ton. Please specify if these factors are expressed in oven dried tons (ODT).

7. Based on the application and the process diagram, it appears the VOC emissions from the dry hammermills will not be controlled. The only control device associated with these units is the baghouse used for particulate matter control. Please confirm that there is no VOC control on the dry hammermills.

8. Under Table B-10: Potential VOC Emissions from the Dry Hammermills, Note 2 states that the VOC emission factor used for the calculations is from a 2013/2014 engineering test performed on a dry classisizer unit at the Pinnacle Aliceville Facility. Please provide us with a copy of this study and/or information to support this factor being representative of the potential emissions at the Newton facility. Also, please provide an explanation as to what a "classisizer" is and why its emissions would be comparable to the dry hammermills at the Newton, MS facility.

9. The application does not adequately address condensable particulate matter (PM) emissions. The application states that condensable PM is "negligible," but no supporting calculations were provided to support that statement.

10. Emission factors from the vendor were provided in units of lb/hr, however the application does not specify the throughput that was used to derive those factors.

11. Please provide a proposed change-out frequency for the catalyst in the RCO.

12. The application does not address the ratio of softwood to hardwood that will be used at the Pinnacle Facility.

13. Pinnacle is located adjacent to Biewer Sawmill Newton LLC and will receive sawdust, shavings, bark, and wood chips from Biewer. Please verify that Pinnacle is not considered to be under "common control" with the adjacent Biewer facility.

Please address the above deficiencies by **November 29, 2019**. Upon receipt of this information, the Environmental Permits Division will continue the permitting process for your facility.

If you have any questions regarding the application or the permitting process, please contact me at (601) 961-5312.

Sincerely,

Megan Rupp
Environmental Permits Division

cc: Jeremiah Redman, Trinity Consultants, via email

# Attachment 2 – Updated Permit Application

# AIR PERMIT APPLICATION

## Pinnacle Renewable Energy Inc. > Newton, Mississippi

Pinnacle.
RENEWABLE ENERGY INC.

### Wood Pellet Production Facility


**TRINITY CONSULTANTS**
1 Perimeter Park S
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(205) 970-6035


August 2019
Revised November 2019

Project 190101.0031

Trinity Consultants

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# TABLE OF CONTENTS

# 1. EXECUTIVE SUMMARY

Pinnacle Renewable Energy Inc. (Pinnacle) is requesting air permit(s) from the Mississippi Department of Environmental quality (MDEQ) for construction and operation of a greenfield wood pellet production facility in Newton, Newton County, Mississippi (Newton facility).

The proposed Newton facility operations will include a wood chips, sawdust, bark, and shavings receiving, processing, and storage area, one (1) dryer, nine (9) wood pellet production and cooling lines, wood pellets storage, and a truck loadout area. The raw materials will be delivered to the facility via trucks. Pinnacle may process whole logs in the future, but to start the facility will only process received green sawdust, shavings, bark and wood chips. Potential emissions from future debarking and cutting operations associated with processing whole logs are included in this application. Pinnacle proposes to limit potential facility-wide emissions of volatile organic compounds (VOC) of the Newton facility to 250 tons per year (tpy) to ensure the facility is classified as a synthetic minor source with respect to the federal Prevention of Significant Deterioration (PSD) program.

The Newton facility will be a major source with respect to the Title V permitting program as potential emissions of VOC from point sources will potentially exceed the applicable major source threshold of 100 tpy. The facility will be a minor source of hazardous air pollutants (HAP) as potential emissions of each individual HAP are less than the applicable major source threshold of 10 tpy while total HAP are less than the 25 tpy major source threshold.

The federal New Source Review (NSR) program is applicable to new major sources and major modifications at existing major sources. The Newton facility is located in Newton County, which has been classified as in attainment with the National Ambient Air Quality Standards (NAAQS) or unclassified for all regulated pollutants.[1] Therefore, the Newton facility is not subject to nonattainment NSR (NNSR) permitting requirements for any criteria pollutants. The proposed facility is potentially subject to PSD permitting requirements, but will be a minor source with respect to PSD permitting due to potential PSD-regulated pollutant emissions less than the respective major source thresholds at the requested production throughput limit of 440,000 tpy.

The following information is included as part of this Air Permit application submittal package:

- Section 2 provides a description of the proposed greenfield facility operations;
- Section 3 discusses the emissions calculation methodologies and presents the facility-wide potential emissions;
- Section 4 details the regulatory applicability analysis;
- Appendix A includes the area map, process flow diagram, and proposed plot plan;
- Appendix B presents the detailed emissions calculations;
- Appendix C includes the required MDEQ air permit application forms; and
- Appendix D includes additional documentation for the VOC emission factors relied upon for this application.

[1] 40 CFR 81.311.

# 2. DESCRIPTION OF FACILITY

The Newton facility will be located in Newton County, Newton, Mississippi. Newton County has been designated as an “attainment area” or “unclassified” for all criteria pollutants.

## 2.1. SITE DESCRIPTION

Pinnacle is proposing to construct and operate a greenfield wood pellet production facility in Newton, Mississippi. The operations are categorized under Standard Industrial Classification (SIC) code 2499*, Wood Products – Not Elsewhere Classified*. The Newton facility will process wood chips, sawdust, and other wood materials into fuel pellets, to produce a source of alternative renewable fuel for solid fuel combustion sources.

## 2.2. PROCESS DESCRIPTION

The proposed Newton facility operations will include a wood chips receiving and processing area, bark/shavings receiving and storage, one (1) dryer, nine (9) wood pellet production and cooling lines, wood pellets storage, and a truck loadout area. Future operations may include a debarker and a chipper for the purpose of processing whole logs. For the purposes of estimating potential emissions, the Newton facility is assumed to operate continuously [8,760 hours per year (hr/yr)].

### 2.2.1. Raw Material Receiving and Storage Area

Green sawdust, shavings, bark and wood chips are delivered to the Newton facility via trucks. The trucks will travel on paved roadways to the green raw materials receiving area. The trucks are unloaded and a front end loader moves the sawdust and wood chips to the green raw material storage pile. Front-end loaders (FEL) distribute the material throughout the storage area. Additionally, Pinnacle will have the ability to process up to 100,000 ton per year of received dry wood shavings (also via trucks), which will be stored in a separate enclosed storage tent.

Future operations include the processing of whole logs. Tree length logs will be delivered by truck on paved roadways. Logs will be fed to the debarker and the chipper. The resulting sawdust, shavings, bark and wood chips will be moved to the green raw material storage pile to be processed with the received raw material.

Fugitive emissions are reduced due to the inherent moisture content (approximately 50%) of the wet raw materials. Fugitive emissions from dry shavings are reduced by utilization of enclosed (i.e., tent) storage.

### 2.2.2. Green Raw Material Drying and Material Storage

The FEL will transfer the green sawdust and wood chips from the green raw material storage area to a feed bin, which will be connected to a conveyor. The green sawdust, shavings, bark, and wood chips from the infeed bin will be fed directly to the rotary dryer or will be diverted to the burner fuel bin. The dryer processes the material from an in-feed moisture content of approximately 50% to a 5-10% final moisture content. The inlet dryer air will dry the green raw material that passes through the dryer drum. The reduction in moisture content in the dryers decreases the hot gas temperature to approximately 240° F at the drum outlet. The dryer step grate furnace burner (170 MMBtu/hr heat input capacity) will combust biomass (wood materials).

The moisture rich exhaust gases mixed with fine particulate will be routed to the wet electrostatic precipitator (WESP) to separate the fine particulate from the exhaust gas stream. The dried wood materials in the gaseous stream are collected from the WESP for later use in the rotary dryer combustion system or fiber infeed system for pellet production. Dried material will be passed through the dryer into the post-dryer operations.

Exhaust gases from the dryer will contain VOCs released during the drying process of green raw materials due to increased temperature. After the WESP, the exhaust stream from the dryer is controlled by the regenerative thermal oxidizer (RTO1) for reduction of VOC and organic HAP emissions from the dryer system. The RTO1 unit includes one (1) burner (maximum heat input capacity of 10.0 MMBtu/hr) that combusts natural gas to oxidize VOC and organic HAP in the exhaust gases to form carbon dioxide ($CO_2$) and water at approximately 1,500° F. Controlled exhaust gases will be released to the atmosphere through the exhaust stack. The dryer system and energy system will have an abort stack which will be closed and only used during periods of emergency or malfunction.

After the drying process, the material will be conveyed to the one (1) dried fiber storage tent or directly into the pellet production process. Any emissions from this source will be considered fugitive emissions.

### 2.2.3. Fuel Preparation System

Bark fuel will be delivered to the proposed facility via truck, and will be delivered to the fuel bin. The material from the fuel bin is conveyed to the step grate burner in front of the dryer. The step grate burner will have a potential maximum heat input capacity of 170 MMBtu/hr, and provides the heat for the dryer.

### 2.2.4. Wood Pelletizing Lines

The dried wood material is transferred via conveyor into one of the four (4) dry hammermills that process the dried material to desired size. The four hammermills exhaust is controlled by a single baghouse.

In the pelletizing area there are nine (9) pellet mills which receive dried materials from the four (4) dry hammermills. In each pellet mill, rollers push the material through the holes of a die plate. Knives on the exterior of the die plate cut the wood pellets from the plate once the pellets achieve the required length. An exhaust system at the discharge of the pellet mills removes any excess moisture and dust generated during the pelletizing process and is conveyed to the pellet line baghouse and the pelletizing regenerative thermal oxidizer (RTO2).

Wood pellets from each pelletizing line are discharged into a pellet cooler, one pellet cooler for each of the pelletizing lines. Wood pellets enter the cooling chamber and flow countercurrent to a stream of ambient air introduced in the cooler. The air flow reduces the temperature of the wood pellets at the point of pellet discharge. The captured exhaust is controlled first by a baghouse for PM emissions control. Subsequently, the exhaust will be controlled by RTO2 for reduction of VOC and organic HAP emissions from the pelletizing lines. The RTO2 unit includes one (1) burner (maximum heat input capacity of 10.0 MMBtu/hr) that combusts natural gas to oxidize VOC and organic HAP in the exhaust gases to form carbon dioxide ($CO_2$) and water at approximately 1,500° F. Controlled exhaust gases will be released to the atmosphere through the exhaust stack.

### 2.2.5. Pellet Storage and Loadout

Cooled pellets will be stored in an atmospheric weather-tight storage silo (PSS1). The pellet storage silo will vent directly to the atmosphere. Wood pellets will be conveyed to be loaded onto a truck for final shipment to the Pinnacle mill in Demopolis, AL. PM emissions from the truck loadout are not controlled.

### 2.2.6. Emission Unit Summary

Included below is a summary of the proposed emission units and air pollution control devices (APCD) at the Newton facility and the associated identification numbers used throughout this application.

**Table 2-1. Proposed Emission Units and Control Devices**

| EP ID | APCD ID | Emission Sources |
|---|---|---|
| RD | WESP/RTO1 | Biomass Rotary Dryer |
| HM1 - HM4 | BAG1 | Dry Hammermill #1 - #4 |
| PL1 - PL9 | BAG2/RTO2 | Pellet Line No. 1 - 9 |
| PSS1 | N/A | Pellet Storage Silo |
| TLS | N/A | Truck Loadout System |
| ENG1 | N/A | 500 kW Emergency Generator |
| ENG2 | N/A | 300 kW Emergency Generator |
| ENG3 | N/A | 150 kW Emergency Generator |
| ENG4 | N/A | 25 kW Emergency Generator |
| ENG5 | N/A | 25 kW Emergency Generator |
| FWP1 | N/A | 127 kW Fire Pump Engine |
| ***Fugitive Sources*** | | |
| F-DB | N/A | Log Debarker |
| F-CH | N/A | Chipper |
| F-STP1 | N/A | Greenwood Storage Pile |
| F-MT | N/A | Material Transfer |
| FDCS | N/A | Fugitive Dry Chip Storage |

This section presents the methodology used to quantify pollutant emissions from the Newton facility. Pollutants emitted from the facility include VOC, PM, $PM_{10}$, $PM_{2.5}$, $NO_X$, CO, sulfur dioxide ($SO_2$), greenhouse gases (GHG) in the form of carbon dioxide equivalent ($CO_2e$), and HAPs.

## 3.1. DRYER

As detailed in Section 2.2.3 of the permit application, exhaust gases from the dryer are exhausted through a WESP, and then RTO1 (control devices operating in series). The Newton facility has the capability of burning biomass in the step grate burner. As such, potential emissions are conservatively calculated based on the maximum potential emissions from combusting wood fuel in the dryer burner on an annual basis (8,760 hr/yr).

The potential criteria pollutant emissions estimated for the dryer utilized:

- Vendor guaranteed emission rates for CO, $NO_X$, Total PM, and VOC. Previous compliance testing results by a similar facility owned by Pinnacle (Pinnacle Aliceville, formerly known as Westervelt Aliceville) supports lower emission rates for CO, $NO_X$, Total PM, and VOC (with an included 25% safety factor);
  - Please see Appendix D for additional information.
- AP-42 Section 1.6 wood residue combustion emission factors for $SO_2$, lead, and Greenhouse Gases (GHG);
- Georgia Environmental Protection Division (GA EPD) Recommended Emission Factors for Wood Pellet Manufacturing for Acetaldehyde, Formaldehyde, Hydrogen Chloride (HCl), and Methanol; and
- GA EPD guidance for WESP HCl emissions control efficiency.

As the Pinnacle Aliceville facility has a rotary dryer of comparable size and can process more green wood per hour, Pinnacle believes with the applied 25% safety factor, the emissions units are similar and conservative for use in estimating emissions at the Newton facility. With the use of the WESP and RTO1 (both of which operated during the referenced compliance testing by Westervelt Aliceville), Pinnacle feels the compliance testing results are an accurate conservative estimation of the identified criteria pollutant emissions in Appendix B. Table 3-1 is a comparison of the dryers at Pinnacle's Aliceville facility and the dryer to be installed at the Newton facility.

**Table 3-1. Comparison of Biomass Rotary Dryers at Pinnacle Facilities**

| Operating Parameter | Proposed Newton Dryer | Existing Aliceville Dryer |
|---|---|---|
| Fuels Combusted | Biomass | Biomass |
| Burner Size (MMBtu/hr) | 170 | 151 |
| Max Process Throughput (tpy) | 440,000 | 512,570 |
| RTO Aux. Burner Size (MMBtu/hr) | 10 | 14 |
| RTO Aux. Combustion Fuel | Natural Gas | Natural Gas |

The Aliceville testing information is provided to demonstrate the inherent conservatism of the vendor guaranteed emission rates used for this application. Table 3-2 is a comparison of the emissions calculated based on Aliceville testing results (with an included 25% safety factor for VOC) and the vendor guaranteed emissions used for this application.

**Table 3-2. Comparison of Dryer Potential Emissions**

| Pollutants | Potential Emissions from Aliceville Testing Results (lb/hr) | Potential Emissions Guaranteed by Vendor (lb/hr) |
|---|---|---|
| CO | 11.07 | 35.97 |
| $NO_X$ | 13.13 | 22.84 |
| VOC | 7.51 | 10.96 |
| Total PM | 2.39 | 3.44 |

Potential emissions from RTO1 natural gas combustion are estimated using uncontrolled emission factors for natural gas combustion and the natural gas heating value average from AP-42, Section 1.4- Natural Gas Combustion and the maximum burner rating of 10 MMBtu/hr. Emissions from the burner are controlled by RTO1 itself. A conservative control efficiency of 95% was used for VOC and HAP emissions based on a guaranteed destruction rate from the vendor.

## 3.2. DRY HAMMERMILLS, PELLET MILLS, AND PELLET COOLER

Potential PM emissions are calculated using an exit grain loading rate methodology for the hammermill baghouse. This method uses the conservative estimated mass concentration, 0.01 gr/dscf for the dry hammermill baghouse. The pellet mills and pellet coolers are controlled by a baghouse. Similarly, Pinnacle assumes the same exit grain loading rate methodology for calculating emissions from the pellet lines. Potential PM emission rates from the pellet coolers are vendor guaranteed. Potential annual PM emissions are calculated using the potential cubic flow rate per minute and multiplying by 60 minutes and then 8,760 hr/yr. Since PM emissions from the operations consist of primarily fines, it is assumed that all of the PM is less than 2.5 microns.

Potential VOC emissions from the dry hammermills are determined by utilizing internal testing results obtained at the Aliceville facility for an identical process. Potential emissions of individual organic HAP (specifically, acetaldehyde, formaldehyde, and methanol) from the dry hammermills are estimated using the potential process throughput and uncontrolled acetaldehyde, formaldehyde, and methanol emission factors derived from the Georgia Environmental Protection Division Recommended Emission Factors for Wood Pellet Manufacturing.

Potential VOC emissions from the pellet coolers are based on a vendor guaranteed emission rate. Additionally, Pinnacle has internal test results obtained at the Pinnacle Aliceville facility for an identical process that support a lower emission rate. Potential emissions of individual organic HAP (specifically, acetaldehyde, formaldehyde, and methanol) from the pellet lines routed to RTO2 are determined by using the potential process throughput, acetaldehyde, formaldehyde, and methanol emission factors derived from GA EPD Recommended Emission Factors for Wood Pellet Manufacturing, and a control efficiency of 95% based on a guaranteed destruction rate from the vendor.

Potential emissions from RTO2 natural gas combustion are estimated using a maximum burner rating of 10 MMBtu/hr and uncontrolled emission factors for natural gas combustion and the natural gas heating value average from AP-42, Section 1.4- Natural Gas Combustion. Emissions from the burner are controlled by RTO2 itself. A control efficiency of 95% was used for VOC and HAP emissions was based on a guaranteed destruction rate from the vendor.

## 3.3. WOOD MATERIALS AND PELLETS HANDLING PROCESSES

The green raw materials, green wood handling, dry shavings handling and preparation system are sources of PM emissions and organic HAP emissions. Partial or complete enclosures of fugitive emissions sources (where practicable) are utilized to minimize fugitive PM emissions.

### 3.3.1. Raw Material Receiving and Storage

The green raw material storage pile contributes to fugitive PM and VOC emissions. Potential PM, $PM_{10}$, and $PM_{2.5}$ emissions from the storage pile are estimated using the potential green material throughput and emission factors from EPA Region 10 Memorandum titled "Particulate Matter Potential to Emit Emission Factors for Activities at Sawmills, Excluding Boilers, Located in Pacific Northwest Indian Country". The green material throughput to be received at the Newton facility is assumed to be twice the weight of the dried material throughput due to moisture content. Pinnacle conservatively used emission factors for dry material, as some of the material received at the Newton facility may be dry material. Potential VOC emissions are estimated using the potential green material throughput and a VOC emission factor for stockpiles a chip pile size of 0.25 acres from a Texas Natural Resource Conservation Commission (TNRCC) document for emissions from industrial wood processing.

Material transfer results in fugitive PM emissions. Pinnacle conservatively assumes three (3) material transfer points. Potential PM, $PM_{10}$, and $PM_{2.5}$ emissions from material transfer are estimated using the potential green material throughput, the number of transfer points, and emission factors from EPA Region 10 Memorandum titled "Particulate Matter Potential to Emit Emission Factors for Activities at Sawmills, Excluding Boilers, Located in Pacific Northwest Indian Country".

### 3.3.2. Whole Log Processing

Potential PM emissions from debarking and chipping operations are uncontrolled and considered fugitive. Uncontrolled PM emissions are based on the lumber throughput. The lumber throughput is conservatively estimated by applying a factor of 1.25 to the raw green material throughput.

The Filterable PM and $PM_{10}$ emission factors for debarking and chipping are from the Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fourth Edition with Supplements A, B, and C, AP-42. , per the EPA Factor Information Retrieval (WebFIRE) database, updated 9/7/2016 for SCC Code 3-07-008-01, Log Debarking. The total $PM_{2.5}$ emission factor was based on information presented at the 2015 NCASI Southern Regional Meeting. Pinnacle believes that the factors for debarking may result in an inaccurate overestimate of actual emissions from the chipper. However, Pinnacle is using these factors to estimate emissions from the chipper as no other factors are readily available and because these factors should result in a conservative estimation of emissions.

### 3.3.3. Pellet Storage and Loadout

Emissions from dry chip storage are considered fugitive emissions. Emissions from the pellet storage silo and the truck loadout system are point source emissions. PM emissions from storage and truck loadout are estimated using potential throughput and PM emission factors from AP-42 Section 9.9.1, Table 9.9.1-1: Particulate Emission Factors for Grain Elevators. VOC emissions from storage and truck loadout are based on a VOC emission factor from a Texas Natural Resource Conservation Commission (TNRCC) document for VOC emissions from industrial wood processing. Potential emissions of individual organic HAP (specifically, acetaldehyde, formaldehyde, and methanol) from storage and truck loadout are estimated using the potential process throughput and uncontrolled emission factors derived from the Georgia Environmental Protection Division Recommended Emission Factors for Wood Pellet Manufacturing.

## 3.4. EMERGENCY GENERATOR

The proposed fire pump engine and five (5) emergency generator engines all fire diesel fuel. Emissions from the emergency engines are emitted directly to the atmosphere with units ranging in size from 49 horsepower to 757 horsepower. The units emit combustion pollutants, including PM, $NO_X$, CO, VOC, $SO_2$, $CO_2e$, and organic HAP. PM, CO, and $NO_X$ emissions from diesel combustion in the engines are calculated using the applicable emission standards of NSPS Subpart IIII. $SO_2$ emissions are limited by the sulfur content of the fuel as required by NSPS Subpart IIII. For all other pollutants, emission factors from US EPA's AP-42, Fifth Edition, Volume I, Chapter 3, Section 3.3, *Gasoline and Diesel Industrial Engines* were used to calculate emissions. Potential hourly emissions are calculated using respective engine horsepower ratings of each engine and the lb/hp-hr or g/hp-hr emission factor. Potential annual emissions are calculated based on a potential annual usage of 500 hr/yr allowed for emergency engines including the RICE MACT allowed maintenance and readiness testing operation.

## 3.5. FACILITY-WIDE EMISSIONS

Table 3-3 includes the facility-wide controlled criteria pollutant and HAP emissions following the proposed greenfield facility operations at the Newton facility. Detailed potential emissions calculations are included as Appendix B of the permit application. The potential emissions calculations in Table 3-3 include point source emissions only and exclude fugitive emissions. The fugitive emissions are excluded because the wood pellet production operation is not on the PSD List of 28 categories with a lower major source threshold (100 tpy), which requires subject source categories to include fugitive emissions for permitting applicability determinations.

**Table 3-3. Facility-Wide Potential Point Source Emissions**

| Pollutant | Potential Facility-Wide Point Source Emissions (tpy) | Title V Major Source Threshold (tpy) | Title V Major? (Yes/No) | PSD Major Source Threshold (tpy) | PSD Major? (Yes/No) |
|---|---|---|---|---|---|
| Filterable PM | 77.26 | 100 | No | 250 | No |
| Total $PM_{10}$ | 61.65 | 100 | No | 250 | No |
| Total $PM_{2.5}$ | 55.21 | 100 | No | 250 | No |
| $NO_X$ | 108.0 | 100 | Yes | 250 | No |
| CO | 163.7 | 100 | Yes | 250 | No |
| VOC | 229.1 | 100 | Yes | 250 | No |
| $SO_2$ | 18.67 | 100 | No | 250 | No |
| Total HAP | 13.55 | 25 | No | N/A | No |
| Max Individual HAP[1] | 4.24 | 10 | No | N/A | No |

1. The maximum inidividual HAP is Hydrogen Chloride.

Potentially applicable federal and state air regulations are identified for the Newton facility in the following section.

## 4.1. NEW SOURCE REVIEW

NSR requires that federal construction permitting of new emission sources or modifications to existing emission sources be completed when significant net emission increases result. Two distinct NSR permitting programs apply depending on whether the facility is located in an attainment or nonattainment area for a particular pollutant. NNSR permitting applies to new construction or modifications that result in emission increases of a particular pollutant for which the area in which the facility is located is classified as "nonattainment" for that pollutant. The PSD program applies to project increases of those pollutants for which the area the facility is located in is classified as "attainment" or "unclassifiable".

The federal NSR program is listed in 40 CFR 51-52. The Newton facility is located in Newton County, which has been classified as in attainment with the NAAQS or unclassified for all regulated pollutants. Therefore, the Newton facility is not subject to NNSR permitting requirements for any criteria pollutants. The proposed facility is potentially subject to PSD permitting requirements.

Under PSD permitting rules, the major source threshold is 250 tpy unless the facility is listed specifically in 40 CFR §52.21 as having a lower major source threshold (100 tpy). Wood pellet production is not on the List of 28 categories detailed in 40 CFR §52.21 with a lower major source threshold for non-GHG PSD pollutants. Also, the Newton facility will not operate fossil-fuel fired boilers with more than 250 MMBtu/hr heat input, which is also identified on the List of 28 categories. The Newton facility is a minor source for the purposes of PSD permitting requirements as potential non-GHG PSD pollutant emissions are less than 250 tpy as identified in Table 3-3. Therefore, PSD permitting is not triggered for the Newton facility. Fugitive emissions are excluded from the PSD applicability determination because the wood pellet production operation is not on the List of 28 categories, which requires subject source categories to include fugitive emissions for non-GHG PSD permitting applicability determinations.

Pinnacle requests as a replacement for the process weight rule and fuel burning equipment allowable PM emission rates, the potential emissions included in Appendix B represent the PM emission limits for each emission unit concerning PSD applicability.[2]

## 4.2. NEW SOURCE PERFORMANCE STANDARDS

MDEQ has received delegation from EPA to regulate facilities subject to New Source Performance Standards (NSPS). Regulatory requirements for facilities subject to NSPS are incorporated by reference in 11 Mississippi Administrative Code (11 Miss. Admin. Code) Pt. 2, Ch. 1, Rule 1.6 and promulgated in 40 CFR Part 60. NSPS require new, modified, or reconstructed sources to control emissions to the level achievable by the best-demonstrated technology as specified in the applicable provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, unless specifically excluded.

Pinnacle has determined that an NSPS is potentially applicable to the wood pellet production operations at the Newton facility.

[2] Process Weight Rule per 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.F.(1), Manufacturing Processes.

### 4.2.1. 40 CFR 60 Subpart A – General Provisions

All affected sources are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification and performance testing, recordkeeping, monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable. Subpart A will be applicable as Subpart IIII will be applicable and does not specifically exclude Subpart A.

### 4.2.2. 40 CFR 60 Subpart D – Fossil Fuel-Fired Steam Generators

NSPS Subpart D, *Standards of Performance for Fossil Fuel-Fired Steam Generators for which Construction is Commenced after August 17, 1971*, applies to steam generating units with a heat input capacity of 250 MMBtu/hr or greater from fossil fuel combustion for which construction is commenced after August 17, 1971. Pinnacle is not proposing installation of any steam generating units. Therefore, the facility will not be subject to NSPS Subpart D.

### 4.2.3. 40 CFR 60 Subpart Db – Industrial, Commercial, and Institutional Steam Generating Units

NSPS Subpart Db, *Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units*, applies to industrial, commercial, and institutional steam generating units with a heat input greater than 100 MMBtu/hr that began construction, modification, or reconstruction after June 19, 1984. Pinnacle is not proposing installation of any steam generating units.

The suspension burner in the dryer includes one (1) 170 MMBtu/hr burner firing biomass (wood materials) to provide heat for the dryer. The burner will be utilized to generate heat for drying of green raw wood materials only, and no heat from the burner will be utilized to generate steam for the pelletizing process at the Newton facility.

Dryers associated with a bark burner system at an oriented strand board (OSB) facility in Thomasville, Alabama were not identified as process heaters and thereby exempt from NSPS Subpart Db.[3] EPA determined that the combination bark burner/rotary dryer/thermal oil heater system (bark burner system) at the OSB facility is subject to Subpart Db, stating that the bark burner system as a whole meets the definition of a "steam generating unit" in Subpart Db, and it is not a process heater. EPA further determined that since the bark burner system consists of two burner units, each with a heat input capacity greater than 100 MMBtu/hr, that each burner would be a separate affected facility under Subpart Db.

The dryer at the Newton facility is similar to the OSB facility's bark burner system with the main difference that the Newton facility system is utilized for drying only rather than steam generation as well, like the previously described OSB facility. Based on the EPA determination for the OSB facility, Subpart Db requirements are not applicable for the Newton facility dryer since the units are not defined as steam generating units. Therefore, the facility will not be subject to NSPS Subpart Db.

### 4.2.4. 40 CFR 60 Subpart Dc – Small Steam Generating Units

NSPS Subpart Dc, *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units*, applies to steam generating units with a maximum heat input capacity of 100 MMBtu/hr or less, but greater than

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[3] EPA Applicability Determination Index (ADI) summary for Louisiana-Pacific Corporation from Mr. Ken Gigliello, Acting Director of the Compliance Assessment and Media Programs Division, October 2, 2008, ADI Control Number 0800089.

or equal to 10 MMBtu/hr. The applicability date for Subpart Dc is June 9, 1989. Pinnacle is not proposing installation of any steam generating units. The suspension grate burner is rated at 170 MMBtu/hr which is greater than the applicability. Therefore, the facility will not be subject to NSPS Subpart Dc.

### 4.2.5. 40 CFR 60 Subpart E – Incinerators

NSPS Subpart E, *Standards of Performance for Incinerators*, applies to incinerators with a charging rate of 50 tons/day for which construction or modification commenced after August 17, 1971. An incinerator is defined in §60.51(a) as any furnace used in the process of burning solid waste for the purpose of reducing the volume of the waste by removing combustible matter. Solid waste is defined in the rule as "refuse, more than 50 percent of which is municipal type waste consisting of a mixture of paper, wood, yard wastes, food wastes, plastics, leather, rubber, and other combustibles, and noncombustible materials such as glass and rock."[4] The dryer system burner at the Newton facility will not combust solid waste for the purpose of reducing the volume of the waste. Therefore, NSPS Subpart E is not applicable.

### 4.2.6. 40 CFR 60 Subpart IIII – Compression Ignition Internal Combustion Engines

NSPS Subpart IIII applies to new compression ignition (CI) internal combustion engines (ICE). Fire pumps are subject to the rule if they were manufactured after July 1, 2006. The Newton facility is proposing to operate up to five (5) CI ICE emergency generators and one (1) fire pumps; therefore, the facility is subject to this regulation and Pinnacle will comply with the rule accordingly. The facility shall comply with the following requirements:

- Using only ultra-low sulfur diesel;
- Operate, maintain, install, and configure the engines per the manufacturer's instructions;
- Maintain a copy of the US EPA certificate for the engine;
- Ensure the engine is equipped with a non-resettable hour meter and that run logs noting the reason for operation are maintained.

Operations of the emergency engine are restricted to 100 hours per year for maintenance and readiness testing and other authorized non-emergency uses. The engines at the Newton facility will be in compliance with the requirements of Subpart IIII prior to the commencement of Pinnacle operations.

### 4.2.7. 40 CFR 60 Subpart JJJJ – Spark Ignition Internal Combustion Engines

NSPS Subpart JJJJ applies to new and modified spark ignition (SI) ICE units. Per 40 CFR 60.4230(a)(4), stationary SI ICE for which construction commenced after June 12, 2005 and which are emergency engines with maximum power outputs greater than 25 hp are subject to Subpart JJJJ if they were manufactured on or after January 1, 2009. The Newton facility is not proposing to operate an emergency SI ICE. Therefore, NSPS Subpart JJJJ is not applicable.

## 4.3. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

National Emission Standards for Hazardous Air Pollutants (NESHAP) are emission standards for HAP and are applicable to major and area sources of HAP. A HAP major source is defined as a facility with potential emissions in excess of 25 tpy for total HAP or potential emissions in excess of 10 tpy for any individual HAP. An area source is a stationary source that is not a major source. Part 63 NESHAP allowable emission limits are established on the basis of a Maximum Achievable Control Technology (MACT) determination for a particular source category.

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[4] 40 CFR 60.51(b).

NESHAP apply to sources in specifically regulated industrial source categories [CAA Section 112(d)] or on a case-by-case basis [Section 112(g)] for facilities not regulated as a specific industrial source type. As identified in Table 3-3, the Newton facility is a minor source (area source) of HAP emissions since maximum individual HAP emissions are less than 10 tpy and total HAP emissions are less than 25 tpy.

Similar to NSPS, any source subject to a NESHAP is also subject to the general provision of NESHAP Subpart A, unless specifically excluded. Regulatory requirements for facilities subject to Part 61 and Part 63 NESHAP are incorporated by reference in 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.8.

### 4.3.1. 40 CFR 63 Subpart A – General Provisions

All affected sources are subject to the general provisions of Part 63 NESHAP Subpart A unless specifically excluded by the source-specific NESHAP. Subpart A requires initial notification and performance testing, recordkeeping, monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

### 4.3.2. 40 CFR 63 Subpart DDDD – Plywood and Composite Wood Products

NESHAP Subpart DDDD, *NESHAP for Plywood and Composite Wood Products*, applies to major sources of HAP that manufacture plywood or composite wood products by bonding wood materials (fibers, particles, strands, veneers, etc.) or agricultural fiber, generally with resin under heat and pressure, to form a structural panel or engineered wood product. The Newton facility will not use any form of resin or manufacture structural panels or any similar type of wood product (i.e., veneer, particleboard, fiberboard, kiln-dried lumber). Furthermore, the facility is an area source of HAP; therefore, NESHAP Subpart DDDD is not applicable.

### 4.3.3. 40 CFR 63 Subpart ZZZZ – Reciprocating Internal Combustion Engines

NESHAP Subpart ZZZZ regulates HAP emissions from reciprocating internal combustion engines (RICE) at both major and area sources of HAP. The Newton facility will operate six (6) diesel-fired emergency generators that are subject to NESHAP Subpart ZZZZ. As the units are emergency CI ICE that have a maximum power output greater than 25 hp and which was manufactured before January 1, 2009, the generators and fire pump engine are considered a new unit under the rule. New units will demonstrate compliance with the RICE MACT by demonstrating compliance with the applicable NSPS. Pinnacle will comply with the appropriate engine NSPS as applicable.

### 4.3.4. 40 CFR 63 Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters

The revised NESHAP Subpart DDDDD, *NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters* regulates HAP emissions from solid, liquid, and gaseous-fired boilers and steam generating units at major sources of HAP emissions. The Newton facility is a minor source of HAP emissions; and there are no proposed boilers or process heaters, therefore, the facility is not subject to Subpart DDDDD.

### 4.3.5. 40 CFR 63 Subpart JJJJJJ – Area Sources: Industrial, Commercial, and Institutional Boilers

NESHAP Subpart JJJJJJ, *NESHAP for Area Sources: Industrial, Commercial, and Institutional Boilers,* regulates HAP emissions from boilers and steam generating units at facilities that are area sources of HAP emissions. There are no boilers being installed at the facility. The step grate burner for the wood dryer provides direct heat to the dryers and does not generate steam. As such, the unit is not considered a boiler and is not subject to Subpart JJJJJJ.

### 4.3.6. 40 CFR 63 Subpart QQQQQQ - Wood Preserving (Area Sources)

NESHAP Subpart QQQQQQ, *NESHAP for Wood Preserving Area Sources*, applies to area sources of HAP that conduct wood preserving operations. A wood preserving operation is defined by Subpart QQQQQQ as a pressure treatment process with use of a wood preservative containing chromium, arsenic, dioxins, or methylene chloride, where the preservative is applied to the wood product inside a retort or similarly closed vessel. The Newton facility will not use any wood preservatives in the production of wood pellets. Therefore, NESHAP Subpart QQQQQQ is not applicable.

## 4.4. TITLE V OPERATING PERMIT PROGRAM

40 CFR 70 establishes the federal Title V operating permit program. MDEQ has incorporated the provisions of the federal program in 11 Miss. Admin. Code Pt. 2, Ch. 6 *Air Emissions Operating Permit Regulations for Purposes of Title V of the Federal Clean Air Act*. The major source thresholds with respect to the Mississippi Title V operating permit program for sources in attainment areas are 10 tpy for an individual HAP, 25 tpy for total HAP emissions, or 100 tpy of an individual criteria pollutant

As identified previously in Table 3-3, the potential criteria pollutant emissions from point sources will exceed 100 tpy for at least one criteria pollutant, making the facility a Title V major source. Facility-wide emissions of individual and total HAP are below 25 tpy and 10 tpy, respectively. As required by MDEQ regulation, a Title V operating permit application will be submitted in accordance with the due date identified in the air construction permit.

## 4.5. COMPLIANCE ASSURANCE MONITORING

Under 40 CFR 64, the Compliance Assurance Monitoring (CAM) regulations, facilities are required to prepare and submit monitoring plans for certain emissions units with the initial or renewal Title V operating permit application. The CAM Plans are intended to provide an on-going and reasonable assurance of compliance with emission limits. Under the general applicability criteria, this regulation only applies to emission units that use a control device to achieve compliance with an emission limit and whose pre-controlled emission levels exceed the major source thresholds under the Title V operating permit program. For a subject unit whose post-controlled emissions also exceed the major source threshold, a CAM plan is required to be submitted with the initial Title V operating permit application. For a subject unit whose post-control emissions are less than the major source threshold, a CAM plan does not have to be submitted until the first renewal application.

CAM applicability is triggered for RTO1 on the rotary dryer and the RTO2 on the pellet lines as the facility is limiting potential throughput to ensure that the facility is a PSD minor source, the pre-control emission levels of the rotary dryer and pellet lines exceed the major source threshold and the post-control emission levels are less than the major source threshold. As this application is for the purpose of the initial construction permits, no CAM plan was included as part of the application and a CAM plan will be included with the first Title V renewal application.

## 4.6. MDEQ AIR REGULATIONS

The Newton facility will also be subject to 11 Miss. Admin. Code Pt. 2: Air Regulations. The facility will potentially be subject to a number of standards under these regulations. Applicability to state regulations is discussed in the following subsections.

### 4.6.1. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.A - Smoke

This regulation limits opacity from smoke emitting from a point source to not exceed 40%. Startup opacity levels greater than 40% are limited to no more than 15 minutes per startup in one hour, and no more than three startups in any twenty-four hour period. This regulation will apply to the point sources of emissions at the Newton facility.

### 4.6.2. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.B - Equivalent Opacity

11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.B restricts visible emissions from stationary sources to less than 40 percent opacity, not including uncombined water droplets. This regulation will apply to all manufacturing operations at the Newton facility.

### 4.6.3. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.C - General Nuisances

This regulation pertains to general nuisances from PM emissions. Precautions are to be taken to reduce unnecessary emissions from handling, transport, or storage of materials. If PM emissions cause a nuisance on adjacent property or violate a regulation, control measures may be imposed by MDEQ.

### 4.6.4. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.D - Fuel Burning

This regulation limits PM emissions from fossil fuel burning sources. The dryer burner will combust biomass fuel but will not be used for the purposes of indirect heating. Therefore, the dryer burner will not be subject to this rule and the associated opacity and PM limits specified by the rule. Pinnacle will not operate any equipment at the proposed Newton facility that will be subject to this standard.

### 4.6.5. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.F - Manufacturing Processes, General

11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.F.(1) limits PM process emissions based on the following equation, commonly known as the process weight rule:

$$E = 4.1 \times p^{0.67}$$

where:
E = PM allowable emission rate (lb/hr)
p = process weight input rate (ton/hr)

This regulation is expected to apply to the biomass rotary dryer, the hammermills, and the pellets processing and handling systems.

Table 4-1 includes the PWR allowable PM emissions for the subject sources at the Newton facility. The subject emission sources are less than the PWR allowable limits. Therefore, Pinnacle requests that the potential controlled emissions presented in Appendix B (and the MDEQ forms) represent the potential PM emissions for each applicable emission source in the issued Air Permits, not the PWR allowable limits.

**Table 4-1. PWR Allowable Emission Limits for Subject Emission Units**

| Emission Point ID | Emission Unit | Potential PM Emissions (tpy) | Potential PM Emissions (lb/hr) | Throughput (tpy) | Throughput (tph) | PWR Allowable PM Emissions (lb/hr) |
|---|---|---|---|---|---|---|
| RD | Biomass Rotary Dryer | 15.07 | 3.44 | 440,000 | 50.23 | 56.55 |
| HM1 - HM4 | Dry Hammermill #1 - #4 | 18.77 | 4.29 | 440,000 | 50.23 | 56.55 |
| PL1 - PL9 | Pellet Line No. 1 - 9 | 18.77 | 4.29 | 440,000 | 50.23 | 56.55 |
| PSS1 | Pellet Storage Silo | 5.50 | 1.26 | 440,000 | 50.23 | 56.55 |
| TLS | Truck Loadout System | 18.92 | 4.32 | 440,000 | 50.23 | 56.55 |

### 4.6.6. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.G - Open Burning

This regulation prohibits the open burning of residential, commercial, institutional, or industrial solid waste. This regulation will apply to the Newton facility.

### 4.6.7. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.3.H - Incineration

This regulation limits PM emissions from incinerators. An incinerator is defined as a combustion device specifically designed for the destruction by high temperature burning of solid, semi-solid, liquid, or gaseous combustible wastes and from which the solid residues contain little or no combustibles.[5] RTO1 for the dryer and RTO2 for the pellet lines only directly burn natural gas fuel and does not meet the definition of an incinerator because the gaseous stream being destructed is not considered a waste.

### 4.6.8. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.4.A - $SO_2$ Emissions from Fuel Burning

11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.4.A limits $SO_2$ emissions from fuel burning operations to 4.8 lb/MMBtu heat input. This rule specifically regulates the $SO_2$ emissions from emission units producing heat or power by indirect heat transfer. Since Pinnacle combusts fuel in the dryer, this unit is subject to the emission limitation. Pinnacle will demonstrate compliance with the emissions limitation for the dryers by firing biomass (wood) only.

### 4.6.9. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.4.B - $SO_2$ Emissions from Processes

11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.4.B.(1) prohibits emissions of $SO_2$ in excess of 500 ppmv from process equipment constructed after January 25, 1972. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.4.B.(2) prohibits emissions of hydrogen sulfide in excess of one grain per 100 standard cubic feet from any gas stream. These regulations will apply to all process equipment at the Newton facility. This regulation is not applicable to any fuel burning equipment.[6]

### 4.6.10. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.5.B - Miscellaneous Chemical Emissions

This regulation restricts the emission of toxic, noxious, or deleterious substances into the ambient air in concentrations sufficient to affect human health and well-being, or unreasonably interfere with the enjoyment of

[5] 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.2.M.

[6] Mr. Rick Sumrall (MDEQ) indicated that previously named Mississippi Regulation APC-S-1, Subsection 4-2 (now 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.4.B) is not applicable to any fuel burning equipment during a phone conversation with Ms. Jessica Quinn (Trinity Consultants) on July 24, 2008.

property or unreasonably and adversely affect plant or animal life beyond the boundaries of the property. This regulation will be generally applicable to the Newton facility.

### 4.6.11. 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.10 – Provisions for Upsets, Startups, and Shutdowns

This regulation contains requirements related to upsets, startups, shutdowns, and maintenance. The Newton facility will be subject to this regulation and will submit notifications as required.

### 4.6.12. 11 Miss. Admin. Code Pt. 2, Ch. 4 – Mississippi Ambient Air Quality Standards

11 Miss. Admin. Code Pt. 2, Ch. 4 has adopted the federal primary and secondary ambient air quality standards, promulgated in 40 CFR 50, by reference. In addition, this regulation contains ambient air quality standards for odor. In compliance with the regulation, the Newton facility will not emit odorous substances in the ambient air in concentrations sufficient to adversely and unreasonably affect human health and well-being, interfere with the use or enjoyment of property, or affect plant or animal life.

### 4.6.13. New Sources of Air Toxics

Per discussion with MDEQ during the pre-application meeting, MDEQ has reserved the right to require a Toxic Impact Analysis.[7] However, as the facility is a minor source of HAP and the site location is in a rural area and there are no sensitive populations nearby, Pinnacle believes that a state toxic assessment should not be required.

### 4.6.14. Incorporation of Federal Regulations by Reference

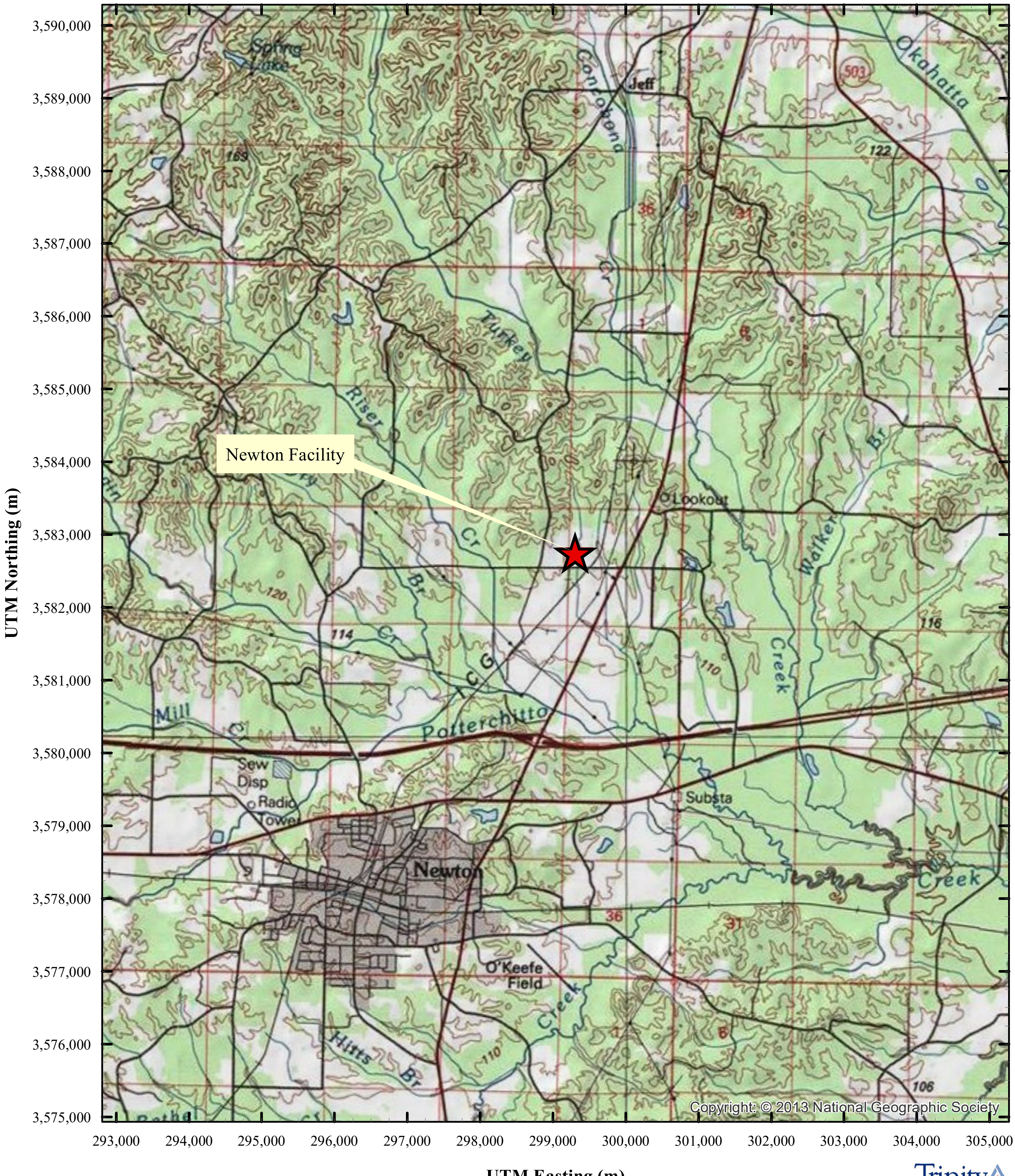
The following federal regulations are incorporated in the Mississippi Administrative Code by reference and were addressed previously in this application:

- 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.6 – NSPS
- 11 Miss. Admin. Code Pt. 2, Ch. 1, Rule 1.8 – NESHAP
- 11 Miss. Admin. Code Pt. 2, Ch. 5 – PSD
- 11 Miss. Admin. Code Pt. 2, Ch. 6 – Title V Operating Permits

[7] Per pre-application call between Mr. Jeremiah Redman (Trinity Consultants), Ms. Maya Rao (Trinity Consultants), Ms. Krystal Rudolph (MDEQ), Ms. Kayra Johnson (MDEQ), and Paul Pawlowski (Pinnacle) on July 26, 2019.

# APPENDIX A: FACILITY FIGURES

**Figure A-1. Area Map**
**Pinnacle Renewable Energy - Newton, Newton County, Mississippi**




Coordinates reflect UTM projection Zone 16, NAD83.

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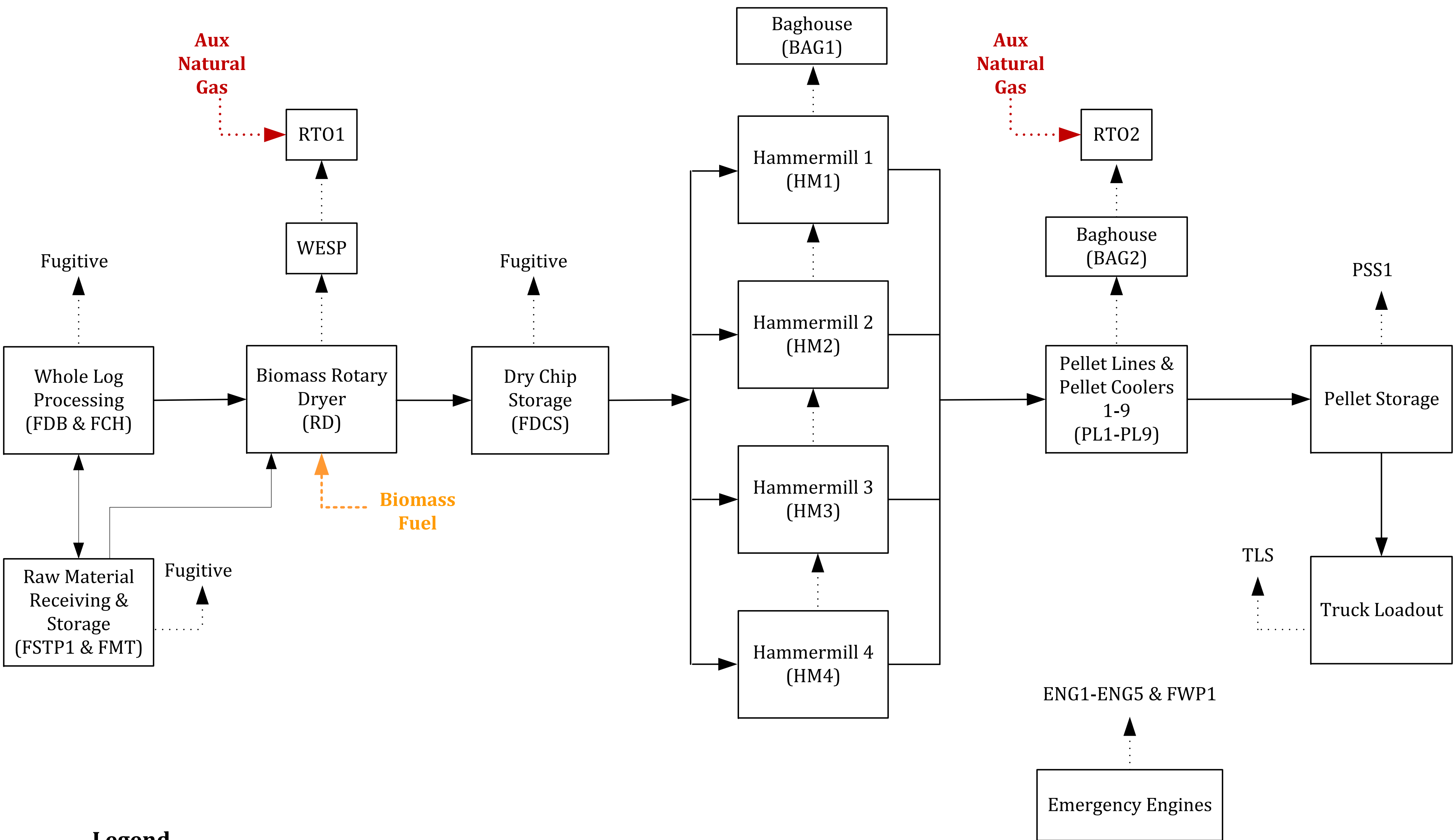


**Legend**

- Process/Process Equipment
- Material Flow
- Emissions
- Fuel
- Natural Gas

**Pinnacle Renewable Energy, Inc.**
Newton, Mississippi

Figure A-2
Process Flow Diagram

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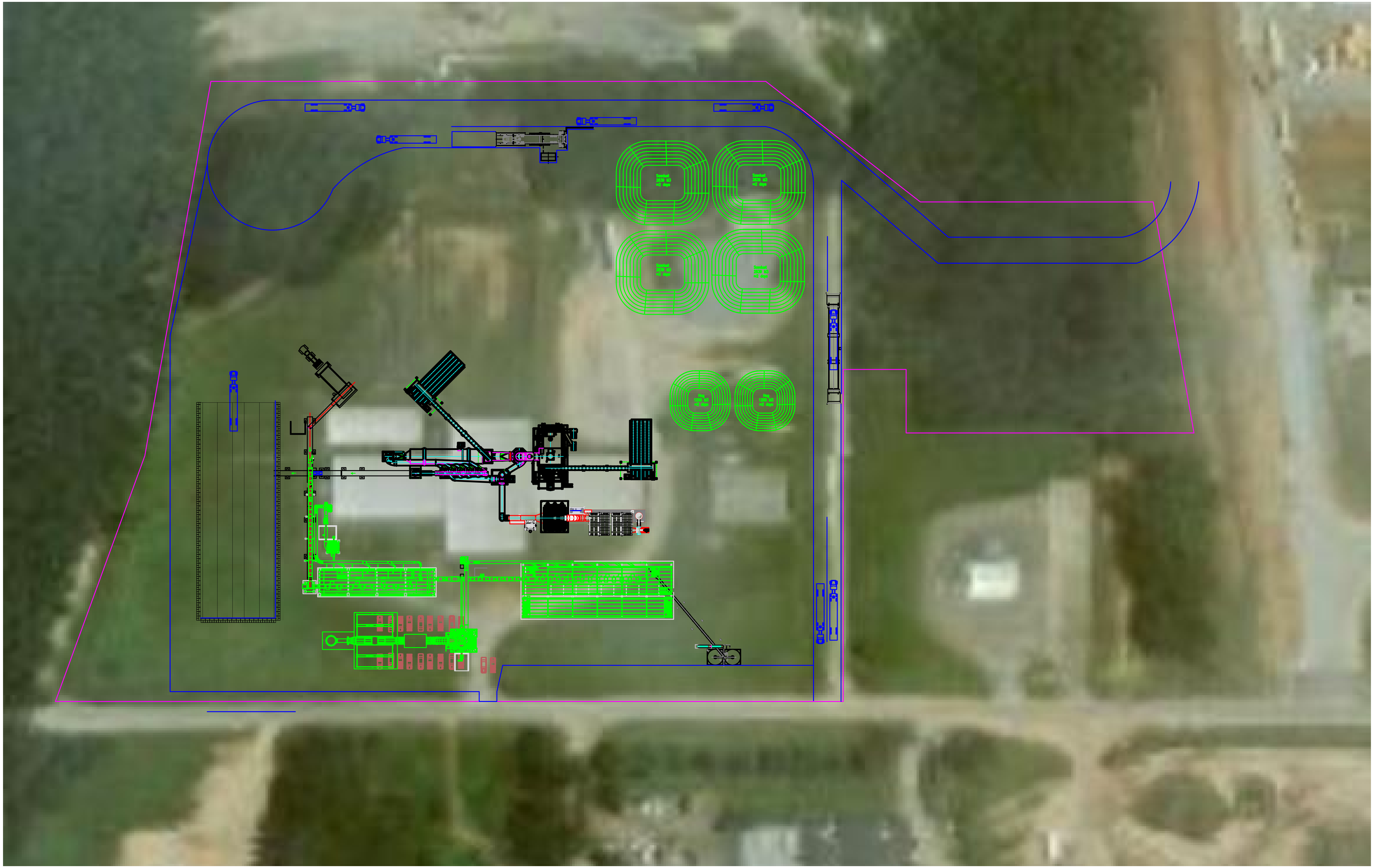
Figure A-3. Facility Plot Plan



# APPENDIX B: POTENTIAL EMISSIONS CALCULATIONS

**Table B-1. Facility-Wide Potential Emissions Summary**

| EP ID | Emission Sources | Facility-Wide Potential Emissions (tpy) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VOC | Filterable PM | Total PM | Total $PM_{10}$ | Total $PM_{2.5}$ | $NO_X$ | $SO_2$ | CO | Acetaldehyde | Formaldehyde | Hydrogen Chloride (HCl) | Methanol | Total HAP |
| RD | Biomass Rotary Dryer | 48.00 | 15.07 | 15.07 | 15.07 | 15.07 | 100.06 | 18.62 | 157.53 | 1.21 | 1.54 | 4.24 | 1.21 | 8.20 |
| HM1 - HM4 | Dry Hammermill #1 - #4 | 135.24 | 18.77 | 18.77 | 18.77 | 18.77 | - | - | - | 0.88 | 1.76 | - | 0.88 | 3.52 |
| PL1 - PL9 | Pellet Line No. 1 - 9 | 32.54 | 18.77 | 18.77 | 18.77 | 18.77 | - | - | - | 0.01 | 0.02 | - | 0.01 | 0.04 |
| PSS1 | Pellet Storage Silo | 6.10 | 5.50 | 5.50 | 1.39 | 0.24 | - | - | - | 0.22 | 0.44 | - | 0.22 | 0.88 |
| TLS | Truck Loadout System | 6.10 | 18.92 | 18.92 | 6.38 | 1.08 | - | - | - | 0.22 | 0.44 | - | 0.22 | 0.88 |
| ENG1 | 500 kW Emergency Generator | 0.47 | 0.06 | 0.42 | 0.42 | 0.42 | 1.99 | 2.06E-03 | 1.09 | 1.02E-03 | 1.56E-03 | - | - | 5.13E-03 |
| ENG2 | 300 kW Emergency Generator | 0.28 | 0.04 | 0.25 | 0.25 | 0.25 | 0.74 | 1.22E-03 | 0.65 | 6.03E-04 | 9.27E-04 | - | - | 3.04E-03 |
| ENG3 | 150 kW Emergency Generator | 0.14 | 0.02 | 0.13 | 0.13 | 0.13 | 0.38 | 6.28E-04 | 0.33 | 3.10E-04 | 4.77E-04 | - | - | 1.57E-03 |
| ENG4 | 25 kW Emergency Generator | 0.03 | 0.01 | 0.03 | 0.03 | 0.03 | 0.09 | 1.33E-04 | 0.10 | 6.58E-05 | 1.01E-04 | - | - | 3.32E-04 |
| ENG5 | 25 kW Emergency Generator | 0.03 | 0.01 | 0.03 | 0.03 | 0.03 | 0.09 | 1.33E-04 | 0.10 | 6.58E-05 | 1.01E-04 | - | - | 3.32E-04 |
| FWP1 | 127 kW Fire Pump Engine | 0.12 | 0.02 | 0.11 | 0.11 | 0.11 | 0.32 | 5.22E-04 | 0.28 | 2.58E-04 | 3.96E-04 | - | - | 1.30E-03 |
| RTO1[1] | Dryer RTO No. 1 *(Natural Gas Combustion)* | - | - | - | - | - | - | 0.03 | - | - | 1.61E-04 | - | - | 4.06E-03 |
| RTO2[2] | Pelletizing RTO No. 2 *(Natural Gas Combustion)* | - | 0.08 | 0.33 | 0.33 | 0.33 | 4.29 | 0.03 | 3.61 | - | 1.61E-04 | - | - | 4.06E-03 |
| ***Fugitive Sources (Not Included in PSD Applicability)*** | | | | | | | | | | | | | | |
| F-DB | Log Debarker | - | 11.00 | 11.00 | 6.05 | 0.03 | - | - | - | - | - | - | - | - |
| F-CH | Chipper | - | 11.00 | 11.00 | 6.05 | 0.03 | - | - | - | - | - | - | - | - |
| F-STP1 | Greenwood Storage Pile | 9.24 | 34.68 | 34.68 | 17.34 | 8.67 | - | - | - | - | - | - | - | - |
| F-MT | Material Transfer | - | 1.98 | 1.98 | 0.92 | 0.13 | - | - | - | - | - | - | - | - |
| FDCS | Fugitive Dry Chip Storage | 6.10 | 5.50 | 5.50 | 1.39 | 0.24 | - | - | - | 0.22 | 0.44 | - | 0.22 | 0.88 |
| **Total Fugitive Source Emissions (Non-PSD Regulated)** | | **15.34** | **64.16** | **64.16** | **31.75** | **9.09** | **--** | **--** | **--** | **0.22** | **0.44** | **--** | **0.22** | **0.88** |
| **Total Point Source Emissions (PSD Regulated)** | | **229.1** | **77.26** | **78.31** | **61.65** | **55.21** | **108.0** | **18.67** | **163.7** | **2.54** | **4.21** | **4.24** | **2.54** | **13.5** |
| **Total Emissions (including fugitives)** | | **244.4** | **141.4** | **142.5** | **93.40** | **64.30** | **108.0** | **18.67** | **163.7** | **2.76** | **4.65** | **4.24** | **2.76** | **14.4** |
| **PSD Threshold (tpy)[3]** | | **250** | **250** | **250** | **250** | **250** | **250** | **250** | **250** | **N/A** | **N/A** | **N/A** | **N/A** | **N/A** |
| **PSD Threshold Exceeded (Yes/No)** | | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **N/A** | **N/A** | **N/A** | **N/A** | **N/A** |

1. Emissions of CO, $NO_X$, VOC, and PM from RTO1 are included in Dryer calculations.

2. VOC emissions from RTO2 are included in Pellet Line calculations.

3. As the Newton facility is a PSD synthetic minor source and wood pellet manufacturing is not on the list of 28 source categories with more stringent standards, fugitive emissions are not evaluated for purposes of PSD applicability (point sources only).

**Table B-2. Potential Emissions for Debarking and Chipping Operations**

| EP ID | Emission Source | Throughput[1] (tpy) | Annual Hours of Operation | Pollutant[2] | Emission Factor[3,4] (lb/ton, wet) | Potential Emissions[5,6] (lb/hr) | Potential Emissions[5,6] (tpy) |
|---|---|---|---|---|---|---|---|
| F-DB | Debarking | 1,100,000 | 8,760 | Filterable PM | 2.00E-02 | 2.51 | 11.00 |
| | | | | Filterable $PM_{10}$ | 1.10E-02 | 1.38 | 6.05 |
| | | | | Filterable $PM_{2.5}$ | 4.60E-05 | 0.01 | 0.03 |
| F-CH | Chipper | 1,100,000 | 8,760 | Filterable PM | 2.00E-02 | 2.51 | 11.00 |
| | | | | Filterable $PM_{10}$ | 1.10E-02 | 1.38 | 6.05 |
| | | | | Filterable $PM_{2.5}$ | 4.60E-05 | 0.01 | 0.03 |

1. Value represents total annual log throughput. Pinnacle conservatively estimated the annual log throughput by multiplying the raw green material throughput by a factor of 1.25.
2. Condensable PM is negligible for this process; therefore, Filterable PM equals Total PM.
3. The factors for Filterable PM and $PM_{10}$ are from Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fourth Edition with Supplements A, B, and C, AP-42. , per the EPA Factor Information Retrieval (WebFIRE) database, updated 9/7/2016 for SCC Code 3-07-008-01, Log Debarking.
4. Based on information presented at the 2015 NCASI Southern Regional Meeting. The Filterable $PM_{2.5}$ factor for drum debarkers listed is 4.6E-05 lb/ton log processed. No additional control applied in the calculation.
5. Potential Emissions (lb/hr) = Potential Annual Emissions (tpy) x 2,000 (lb/ton) ÷ Annual Hours of Operation (hr/yr)
6. Potential Emissions (tpy) = Emission factor (lb/ton) × (1 - Control Efficiency) × Potential Throughput (ton/yr) ÷ 2,000 (lb/ton)

**Table B-3. Potential PM & VOC Emissions from Green Raw Material Receiving & Storage**

| EP ID | Emission Unit | Green Material Throughput[1] (tpy) | PM Emission Factor[2,3] | $PM_{10}$ Emission Factor[2,3] | $PM_{2.5}$ Emission Factor[2,3] | VOC Emission Factor[4] | Emission Factor Units | Potential Emissions[5,6] PM (tpy) | $PM_{10}$ (tpy) | $PM_{2.5}$ (tpy) | VOC (tpy) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F-STP1 | Greenwood Storage Pile | 880,000 | 0.38 | 0.19 | 0.10 | 0.10 | ton/acre-day | 34.7 | 17.3 | 8.7 | 9.2 |
| F-MT | Material Transfer | | 1.50E-03 | 7.00E-04 | 1.00E-04 | N/A | lb/ton (dry) | 1.98 | 0.92 | 0.13 | -- |
| | | | | | | | **Total Emissions:** | **36.7** | **18.3** | **8.8** | **9.2** |

1. The green material throughput to be received at the Newton Pellet Mill is assumed to be twice the weight of the dried material throughput due to moisture content.

2. $PM/PM_{10}/PM_{2.5}$ emission factors from EPA Region 10 Memorandum titled "Particulate Matter Potential to Emit Emission Factors for Activities at Sawmills, Excluding Boilers, Located in Pacific Northwest Indian Country". For the material transfer, Pinnacle has conservatively used the factors for dry material, as some of the material received at the Newton Pellet Mill may be dry material. The emission factors for "material transfer" are for each material drop point. Pinnacle conservatively assumes the following number of transfer points of green material:

Number of Green Material Transfer Points = 3

3. Condensable PM is negligible for this process; therefore, Filterable PM/PM10/PM2.5 equal Total PM/PM10/PM2.5.

4. VOC emission factor for stockpiles from TNRCC document and is estimated assuming a residence time of one day and is based on the following size chip pile:

Chip Pile Size = 0.25 acre

5. Potential Emissions from Chip Pile calculated as follows: Annual Emissions (tpy) = Emission Factor (ton/acre-day) x Chip Pile Size (Acre) x 365 day/year

6. Potential Emissions from Material Transfer calculated as follows: Annual Emissions (tpy) = Emission Factor (lb/ton) x Throughput (ton/year) x No. of Transfer Points ÷ 2,000 (lb/ton)

**Table B-4. Biomass Rotary Dryer Operating Parameters**

| Parameter | Value | Units |
|---|---|---|
| Number of Burners | 1 | burner |
| Unit Heat Input | 170 | MMBtu/hr |
| Max Hourly Throughput | 50.2 | tph |
| Potential Process Throughput | 440,000 | tpy |
| Annual Operation | 8,760 | hr/yr |
| Dryer Flow Rate | 110,000 | dscfm |

**Table B-5. Biomass Rotary Dryer Potential PSD Pollutants and HAP Emissions**

| PSD Pollutants | Emission Factors[1-3] | Emission Factor Units | Maximum Hourly Emissions (lb/hr)[4,5] | Potential Annual Emissions (tpy)[6] |
|---|---|---|---|---|
| CO | 150.0 | ppmvd | 35.97 | 157.5 |
| $NO_X$ | 29.00 | ppmvd | 22.84 | 100.1 |
| VOC | 10.96 | lb/hr | 10.96 | 48.0 |
| Filterble PM | -- | -- | 3.44 | 15.07 |
| Total PM | 3.44 | lb/hr | 3.44 | 15.07 |
| Total $PM_{10}$ | -- | -- | 3.44 | 15.07 |
| Total $PM_{2.5}$ | -- | -- | 3.44 | 15.07 |
| $SO_2$ | 2.50E-02 | lb/MMBtu | 4.25 | 18.6 |
| Lead | 4.80E-05 | lb/MMBtu | 8.16E-03 | 3.57E-02 |
| $CH_4$ | 2.10E-02 | lb/MMBtu | 3.57 | 15.6 |
| $N_2O$ | 1.30E-02 | lb/MMBtu | 2.21 | 9.68 |
| $CO_2$ | 195 | lb/MMBtu | 33,150 | 145,197 |
| $CO_2e$[7] | 199 | lb/MMBtu | 33,898 | 148,472 |
| **HAP Emissions** | | | | |
| Acetaldehyde | 0.11 | lb/ODT | 0.28 | 1.21 |
| Formaldehyde | 0.14 | lb/ODT | 0.35 | 1.54 |
| Hydrogen Chloride | 1.90E-02 | lb/MMBtu | 0.97 | 4.24 |
| Methanol | 0.11 | lb/ODT | 0.28 | 1.21 |
| | | | **Total HAP** | **8.20** |
| | | | **Maximum Individual HAP[8]** | **4.24** |

1. Emission factors for CO and $NO_X$ are vendor guaranteed concentrations at the RTO inlet. Emission factors for VOC and Total PM are vendor guaranteed hourly emission rates. $PM_{10}$ and $PM_{2.5}$ are conservatively assumed to be equivalent to PM. Filterable PM conservatively assumed to be equivalent to total PM.

2. Emission factors for $SO_2$, lead, and GHGs are from AP-42 Section 1.6 (Wood Residue Combustion), Tables 1.6-2 and 1.6-3 (September 2003).

3. Emission Factors for Acetaldehyde, Formaldehyde, Hydrogen Chloride, and Methanol are uncontrolled and from GA EPD Recommended Emission Factors for Wood Pellet Manufacturing with units in lb/ODT for all but Hydrogen Chloride, which is in lb/MMBtu. See control efficiencies for HAP below:

| | | |
|---|---|---|
| Organic HAP Control Efficiency = | 95% | Conservative estimate based on guaranteed destruction rate from vendor |
| HCl Control Efficiency = | 70% | Per GA EPD Guidance for WESP Control |

4. Emission rates for CO, $NO_X$, Total PM, and VOC are vendor guaranteed emission rates. Additionally, Pinnacle has data that supports lower emission rates from July 30, 2015 testing on RTO1 at the Pinnacle Aliceville, AL site (formerly Westervelt Aliceville site). The potential emission rates calculated using emission factors based on the Aliceville test results are as follows:

| | |
|---|---|
| CO Emissions (lb/hr) = Emission Factor (lb/ODT) x Max Hourly Throughput (ton/hr) = | 11.07 |
| $NO_X$ Emissions (lb/hr) = Emission Factor (lb/ODT) x Max Hourly Throughput (ton/hr) = | 13.13 |
| PM Emissions (lb/hr) = Emission Factor (lb/ODT) x Max Hourly Throughput (ton/hr) = | 2.39 |
| VOC Emissions (lb/hr) = Emission Factor (lb/ODT) x Max Hourly Throughput (ton/hr) x (1 + VOC Safety Factor) = | 7.51 |

5. Short-term emissions are calculated as follows:

Emissions (lb/hr) = Emission Factor (lb/MMBtu) × Unit Heat Input (MMBtu/hr) × (1 - Control Efficiency)

Emissions (lb/hr) = Emissionf Factor (lb/ton) × Process Throughput (ton/hr) × (1 - Control Efficiency)

Emissions (lb/hr) = Emission Factor (ppmvd) × Molecular Weight (lb/lb-mol) × Dryer Flow Rate (dscfm) × 60 (min/hr) ÷ $Volume_{ideal}$ ($ft^3$ air/lb-mol air) ÷ $10^6$ × (1 - Control Efficiency)

| | | |
|---|---|---|
| CO MW (lb/lb-mol) = | 28.01 | |
| $NO_X$ MW (lb/lb-mol) = | 46.01 | |
| $Volume_{ideal}$ ($ft^3$ air/lb-mol air) = | 385.5 | |
| CO Control Efficiency = | 50% | Conservative estimate based on guaranteed destruction rate from vendor |

6. Annual emissions are calculated as follows:

Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton)

7. Global warming potential (GWP) for $CH_4$ is 25 and $N_2O$ is 298 for estimating $CO_2e$ emissions (40 CFR 98, Subpart A, Table A-1, effective January 1, 2014).

8. Maximum individual HAP is hydrogen chloride.

**Table B-6. RTO1 Burner Operating Parameters**

| Parameter | | Units |
|---|---|---|
| Number of Burners | 1 | burner |
| Unit Heat Input | 10 | MMBtu/hr |
| Natural Gas Heating Value[1] | 1,020 | MMBtu/MMscf |
| Annual Operation | 8,760 | hr/yr |
| Potential Annual Fuel Usage[2] | 85.9 | MMscf/yr |

1. Natural Gas HHV is the average from the range listed in AP-42, Section 1.4.

2. Potential Annual Fuel Usage calculated as follows:
Annual Fuel Usage (MMscf/yr) = Heat Input (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf) x Annual Operation (hr/yr)

**Table B-7. RTO1 Potential PSD Pollutants and HAP Emissions**

| Pollutant | Natural Gas Uncontrolled Emission Factor[3] (lb/MMscf) | RTO Control Efficiency[4] (%) | Maximum Hourly Emissions[5] (lb/hr) | Potential Annual Emissions[6] (tpy) |
|---|---|---|---|---|
| CO[1] | -- | -- | -- | -- |
| $NO_X$[1] | -- | -- | -- | -- |
| VOC[1] | -- | -- | -- | -- |
| Filterable PM[1] | -- | -- | -- | -- |
| Condensable PM[1] | -- | -- | -- | -- |
| Total PM[1] | -- | -- | -- | -- |
| $SO_2$ | 0.6 | -- | 5.88E-03 | 2.58E-02 |
| $CH_4$ | 2.3 | -- | 2.25E-02 | 9.88E-02 |
| $N_2O$ | 2.2 | -- | 2.16E-02 | 9.45E-02 |
| $CO_2$ | 120,000 | -- | 1,176 | 5,153 |
| $CO_2e$[2] | 120,713 | -- | 1,183 | 5,184 |
| **HAP Emissions** | | | | |
| Benzene | 2.10E-03 | 95% | 1.03E-06 | 4.51E-06 |
| Formaldehyde | 7.50E-02 | 95% | 3.68E-05 | 1.61E-04 |
| Hexane | 1.80 | 95% | 8.82E-04 | 3.86E-03 |
| Naphthalene | 6.10E-04 | 95% | 2.99E-07 | 1.31E-06 |
| Toluene | 3.40E-03 | 95% | 1.67E-06 | 7.30E-06 |
| Total HAP | 1.89 | 95% | 9.26E-04 | 4.06E-03 |
| | | | **Total HAP** | **4.06E-03** |
| | | | **Maximum Individual HAP[7]** | **3.86E-03** |

1. Emissions for CO, $NO_X$, VOC, and PM from RTO1 are included in Dryer calculations.
2. Global warming potential (GWP) for $CH_4$ is 25 and $N_2O$ is 298 for estimating $CO_2e$ emissions (40 CFR 98, Subpart A, Table A-1,
3. Uncontrolled emission factors for natural gas combustion from AP-42, Section 1.4 - Natural Gas Combustion, Table 1.4-1,3 (9/03).
4. Emissions from the burner are controlled by the RTO itself. Additionally, natural gas will only be used as auxiliary fuel. The control efficiency is a conservative estimate based on guaranteed destruction rate from vendor.
5. Short-term emissions are calculated as follows:
   Emissions (lb/hr) = Emission Factor (lb/MMscf) x Unit Heat Input (MMBtu/hr) ÷ Natural Gas Heating Value (MMBtu/MMscf) x Number of Burners x (1 - Control Efficiency)
6. Annual Emissions are calculated as follows:
   Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton)
7. Maximum individual HAP from RTO1 is hexane.

**Table B-8. RTO2 Burner Operating Parameters**

| Parameter | | Units |
|---|---|---|
| Number of Burners | 1 | burner |
| Unit Heat Input | 10 | MMBtu/hr |
| Natural Gas Heating Value[1] | 1,020 | MMBtu/MMscf |
| Annual Operation | 8,760 | hr/yr |
| Potential Annual Fuel Usage[2] | 85.9 | MMscf/yr |

1. Natural Gas HHV is the average from the range listed in AP-42, Section 1.4.

2. Potential Annual Fuel Usage calculated as follows:

Annual Fuel Usage (MMscf/yr) = Heat Input (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf) x Annual Operation (hr/yr)

**Table B-9. RTO2 Potential PSD Pollutants and HAP Emissions**

| Pollutant | Natural Gas Uncontrolled Emission Factor[3] (lb/MMscf) | RTO Control Efficiency[4] (%) | Maximum Hourly Emissions[5] (lb/hr) | Potential Annual Emissions[6] (tpy) |
|---|---|---|---|---|
| VOC[1] | -- | -- | -- | -- |
| CO | 84.00 | -- | 0.82 | 3.61 |
| $NO_X$ | 100.0 | -- | 0.98 | 4.29 |
| Filterable PM | 1.90 | -- | 1.86E-02 | 8.16E-02 |
| Condensable PM | 5.70 | -- | 5.59E-02 | 0.24 |
| Total PM | 7.60 | -- | 7.45E-02 | 0.33 |
| $SO_2$ | 0.6 | -- | 5.88E-03 | 2.58E-02 |
| $CH_4$ | 2.3 | -- | 2.25E-02 | 9.88E-02 |
| $N_2O$ | 2.2 | -- | 2.16E-02 | 9.45E-02 |
| $CO_2$ | 120,000 | -- | 1,176 | 5,153 |
| $CO_2e$[2] | 120,713 | -- | 1,183 | 5,184 |
| **HAP Emissions** | | | | |
| Benzene | 2.10E-03 | 95% | 1.03E-06 | 4.51E-06 |
| Formaldehyde | 7.50E-02 | 95% | 3.68E-05 | 1.61E-04 |
| Hexane | 1.80 | 95% | 8.82E-04 | 3.86E-03 |
| Naphthalene | 6.10E-04 | 95% | 2.99E-07 | 1.31E-06 |
| Toluene | 3.40E-03 | 95% | 1.67E-06 | 7.30E-06 |
| Total HAP | 1.89 | 95% | 9.26E-04 | 4.06E-03 |
| | | | **Total HAP** | **4.06E-03** |
| | | | **Maximum Individual HAP[7]** | **3.86E-03** |

1. VOC Emissions from RTO2 are included in Pelletizing calculations.
2. Global warming potential (GWP) for $CH_4$ is 25 and $N_2O$ is 298 for estimating $CO_2e$ emissions (40 CFR 98, Subpart A, Table A-1, effective January 1, 2014).
3. Uncontrolled emission factors for natural gas combustion from AP-42, Section 1.4 - Natural Gas Combustion, Table 1.4-1,3 (9/03). All PM is assumed to be less than 1.0 mm in diameter; therefore, PM10 and PM2.5 are equivalent to PM.
4. Emissions from the burner are controlled by RTO2 itself. Additionally, natural gas will only be used as auxiliary fuel. The control efficiency is a conservative estimate based on guaranteed destruction rate from vendor.
5. Short-term emissions are calculated as follows:
   Emissions (lb/hr) = Emission Factor (lb/MMscf) x Unit Heat Input (MMBtu/hr) ÷ Natural Gas Heating Value (MMBtu/MMscf) x Number of Burners x (1 - Control Efficiency)
6. Annual Emissions are calculated as follows:
   Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton)
7. Maximum individual HAP from RTO2 is hexane.

**Table B-10. Potential VOC Emissions from Dry Hammermills**

| EP ID | Emission Unit | Potential Annual Throughput[1] (tpy) | VOC Emission Factor[2] (lb/ODT) | Potential VOC Emissions[3] (tpy) | Acetaldehyde Emission Factor[4] (lb/ODT) | Potential Acetaldehyde Emissions[3] (tpy) | Formaldehyde Emission Factor[4] (lb/ODT) | Potential Formaldehyde Emissions[3] (tpy) | Methanol Emission Factor[4] (lb/ODT) | Potential Methanol Emissions[3] (tpy) |
|---|---|---|---|---|---|---|---|---|---|---|
| HM1<br>HM2<br>HM3<br>HM4 | Dry Hammermill #1<br>Dry Hammermill #2<br>Dry Hammermill #3<br>Dry Hammermill #4 | 440,000 | 0.61 | 135.2 | 4.00E-03 | 0.88 | 8.00E-03 | 1.76 | 4.00E-03 | 0.88 |
| | | | **Total Emissions** | **135.2** | | **0.88** | | **1.76** | | **0.88** |

1. Potential Annual Throughput (tpy) = Total Pellet Production (tpy)
Total Pellet Production = 440,000 tpy
2. VOC emission factor is the average value from 2013/2014 engineering testing performed on the Dry Classisizer units at the Pinnacle Aliceville facility (formerly Westervelt Aliceville). A safety factor has been added for conservatism.
Dry Milling VOC Testing Safety Factor = 25%
3. Potential Emissions (tpy) = Emission Factor (lb/ton) x Potential Annual Throughput (tpy)÷ 2,000 (lb/ton).
4. Uncontrolled Acetaldehyde, Formaldehyde, Methanol Emission Factors for Hammermill are derived from GA EPD Recommended Emission Factors for Wood Pellet Manufacturing.

**Table B-11. Potential PM Emissions from Dry Hammermills**

| EP ID | Emission Unit | Control Device | Potential Operation[1] (hr/yr) | Exit Temperature (°F) | Exhaust Flow Rate[2] (acfm) | Exhaust Flow Rate[2] (scfm) | Loading Rate (gr./dscf) | Total PM[3] (lb/hr)[4] | Total PM[3] (tpy)[5] | Total $PM_{10}$[3] (lb/hr)[4] | Total $PM_{10}$[3] (tpy)[5] | Total $PM_{2.5}$[3] (lb/hr)[4] | Total $PM_{2.5}$[3] (tpy)[5] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HM1<br>HM2<br>HM3<br>HM4 | Dry Hammermill #1<br>Dry Hammermill #2<br>Dry Hammermill #3<br>Dry Hammermill #4 | Baghouse | 8,760 | 150 | 57,801 | 50,000 | 0.01 | 4.29 | 18.77 | 4.29 | 18.77 | 4.29 | 18.77 |
| | | | | | | | **Total Emissions:** | **4.29** | **18.77** | **4.29** | **18.77** | **4.29** | **18.77** |

1. Potential operation assumed to be continuous.
2. Exhaust flow rate (scfm) estimated for all hammermills. Exhaust flow converted to acfm assuming 150°F exhaust temperatures at 1 atm.
3. Since PM emissions from the operations consist of primarily fines, it is assumed that all of the particulate matter emitted is less than 2.5 microns. Condensable PM is negligible for this process; therefore, Filterable PM equals Total PM.
4. Potential hourly PM emissions (lb/hr) = Exhaust Grain Loading Rate (gr./dscf) x Exhaust Air Flow Rate (dscf/min) x (60 min/hr) x (lb/7,000 gr.)
5. Potential Annual Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr)÷ 2,000 (lb/ton).

**Table B-12. Potential VOC Emissions - Pellet Coolers**

| | | | VOC[1] | | Acetaldehyde | | | Formaldehyde | | | Methanol | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EP ID | Emission Unit | Potential Annual Pellet Throughput (tpy) | Maximum Hourly (lb/hr) | Potential Annual (tpy) | Emission Factor[2] (lb/ODT) | Maximum Hourly (lb/hr) | Potential Annual (tpy) | Emission Factor[2] (lb/ODT) | Maximum Hourly (lb/hr) | Potential Annual (tpy) | Emission Factor[2] (lb/ODT) | Maximum Hourly (lb/hr) | Potential Annual (tpy) |
| PL1 | Pellet Line No. 1 | 440,000 | 7.43 | 32.54 | 1.00E-03 | 2.51E-03 | 1.10E-02 | 2.00E-03 | 5.02E-03 | 2.20E-02 | 1.00E-03 | 2.51E-03 | 1.10E-02 |
| PL2 | Pellet Line No. 2 | | | | | | | | | | | | |
| PL3 | Pellet Line No. 3 | | | | | | | | | | | | |
| PL4 | Pellet Line No. 4 | | | | | | | | | | | | |
| PL5 | Pellet Line No. 5 | | | | | | | | | | | | |
| PL6 | Pellet Line No. 6 | | | | | | | | | | | | |
| PL7 | Pellet Line No. 7 | | | | | | | | | | | | |
| PL8 | Pellet Line No. 8 | | | | | | | | | | | | |
| PL9 | Pellet Line No. 9 | | | | | | | | | | | | |
| | | **Total Emissions:** | **7.43** | **32.54** | | **2.51E-03** | **1.10E-02** | | **5.02E-03** | **2.20E-02** | | **2.51E-03** | **1.10E-02** |

1. Emission rate for VOC is a vendor guaranteed emission rate. Additionally, Pinnacle has data that supports a lower emission rate from January 2018 engineering testing at Pinnacle Renewable Aliceville facility (previously Westervelt Aliceville) before the replacement RTO2 installation. The potential emission rate calculated using Aliceville testing results is as follows:

Emission Factor from Aliceville Testing Results (lb/ODT) = Average VOC Emissions (lb/hr) ÷ Average Pellet Production (ton/hr) = 1.52

Potential Emissions (tpy) = Emission Factor from Aliceville Testing Results (lb/ODT) x (1 + VOC Safety Factor) x (1 - RTO2 Control Efficiency) x Annual Throughput (tpy) ÷ 2,000 (lb/ton) = 20.88

2. Acetaldehyde, Formaldehyde, and Methanol Emission Factors for Pellet Coolers routed to RTO2 are derived from GA EPD Recommended Emission Factors for Wood Pellet Manufacturing.
3. Annual Emissions (tpy) = Emission Factor (lb/ton) x Annual Throughput (tpy) ÷ 2,000 (lb/ton) x (1 - Control Efficiency)
4. Hourly Emissions (lb/hr) = Annual Emissions (tpy) x 2,000 (lb/ton) ÷ Annual Operation (hr/yr)

RTO2 Control Efficiency = 95% Conservative estimate based on guaranteed destruction rate from vendor

Annual Operation = 8,760 Assumed to be continuous

**Table B-13. Potential PM Emissions from Pellet Mills and Pellet Coolers**

| EP ID | Emission Unit | Control Device | Potential Operation[1] (hr/yr) | Exit Temperature (˚F) | Exhaust Flow Rate[2] (acfm) | Exhaust Flow Rate[2] (scfm) | Loading Rate (gr./dscf) | Total PM[3] (lb/hr)[4,6] | Total PM[3] (tpy)[5,6] | Total $PM_{10}$[3] (lb/hr)[4,6] | Total $PM_{10}$[3] (tpy)[5,6] | Total $PM_{2.5}$[3] (lb/hr)[4,6] | Total $PM_{2.5}$[3] (tpy)[5,6] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PL1 | Pellet Line No. 1 | Baghouse | 8,760 | 150 | 57,801 | 50,000 | 0.01 | 4.29 | 18.77 | 4.29 | 18.77 | 4.29 | 18.77 |
| PL2 | Pellet Line No. 2 | | | | | | | | | | | | |
| PL3 | Pellet Line No. 3 | | | | | | | | | | | | |
| PL4 | Pellet Line No. 4 | | | | | | | | | | | | |
| PL5 | Pellet Line No. 5 | | | | | | | | | | | | |
| PL6 | Pellet Line No. 6 | | | | | | | | | | | | |
| PL7 | Pellet Line No. 7 | | | | | | | | | | | | |
| PL8 | Pellet Line No. 8 | | | | | | | | | | | | |
| PL9 | Pellet Line No. 9 | | | | | | | | | | | | |
| | | | | | | | **Total Emissions:** | **4.29** | **18.77** | **4.29** | **18.77** | **4.29** | **18.77** |

1. Potential operation assumed to be continuous.
2. Exhaust flow rate (scfm) estimated for all pelleters and pellet coolers. Exhaust flow converted to acfm assuming 150F exhaust temperatures at 1 atm.
3. Since PM emissions from the operations consist of primarily fines, it is assumed that all of the particulate matter emitted is less than 2.5 microns. Condensable PM is negligible for this process; therefore, Filterable PM/PM10/PM2.5 equal Total PM/PM10/PM2.5.
4. Potential hourly PM emissions (lb/hr) = Exhaust Grain Loading Rate (gr./dscf) x Exhaust Air Flow Rate (dscf/min) x (60 min/hr) x (lb/7,000 gr.)
5. Potential Annual Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton).
6. PM emission rates are vendor guaranteed.

**Table B-14. Potential VOC Emissions from Miscellaneous Sources**

| EP ID | Emission Unit | Potential Annual Throughput (tpy) | VOC Emission Factor[1] (lb/ODT) | Potential Emissions VOC (tpy) | Acetaldehyde Emission Factor[2] (lb/ODT) | Acetaldehyde Potential Emissions (tpy) | Formaldehyde Emission Factor[2] (lb/ODT) | Formaldehyde Potential Emissions (tpy) | Methanol Emission Factor[2] (lb/ODT) | Methanol Potential Emissions (tpy) |
|---|---|---|---|---|---|---|---|---|---|---|
| FDCS | Fugitive Dry Chip Storage | 440,000 | 2.77E-02 | 6.10 | 1.00E-03 | 0.22 | 2.00E-03 | 0.44 | 1.00E-03 | 0.22 |
| PSS1 | Pellet Storage Silo | 440,000 | 2.77E-02 | 6.10 | 1.00E-03 | 0.22 | 2.00E-03 | 0.44 | 1.00E-03 | 0.22 |
| TLS | Truck Loadout System | 440,000 | 2.77E-02 | 6.10 | 1.00E-03 | 0.22 | 2.00E-03 | 0.44 | 1.00E-03 | 0.22 |

1. VOC emission factor is based on a Texas Natural Resource Conservation Commission (TNRCC) document for VOC emissions from industrial wood processing (April 1995).
2. Uncontrolled Acetaldehyde, Formaldehyde, Methanol Emission Factors for Storage/Handling are derived from GA EPD Recommended Emission Factors for Wood Pellet Manufacturing
3. Emissions (tpy) = Emission Factor (lb/ton) x Potential Annual Throughput (tpy) ÷ 2,000 (lb/ton)

**Table B-15. Potential PM Emissions from Miscellaneous Sources**

| EP ID | Emission Unit | PM Emission Factor[1] (lb/ODT) | $PM_{10}$ Emission Factor[1] (lb/ODT) | $PM_{2.5}$ Emission Factor[1] (lb/ODT) | Potential Emissions[2,3] PM (tpy) | $PM_{10}$ (tpy) | $PM_{2.5}$ (tpy) |
|---|---|---|---|---|---|---|---|
| FDCS | Fugitive Dry Chip Storage | 2.50E-02 | 6.30E-03 | 1.10E-03 | 5.50 | 1.39 | 0.24 |
| PSS1 | Pellet Storage Silo | 2.50E-02 | 6.30E-03 | 1.10E-03 | 5.50 | 1.39 | 0.24 |
| TLS | Truck Loadout System | 8.60E-02 | 2.90E-02 | 4.90E-03 | 18.92 | 6.38 | 1.08 |

1. PM emission factors for storage and truck loadout are from AP-42 Section 9.9.1, Table 9.9.1-1.
2. Calculated as follows using the potential annual throughputs identified in Table B-14:
   Emissions (tpy) = Emission Factor (lb/ton) x Potential Annual Throughput (tpy) ÷ 2,000 (lb/ton)
3. Condensable PM is negligible for this process; therefore, Filterable PM equals Total PM.

**Table B-16. Emergency Generator Engines Operating Parameters**

| Parameter | ENG1 | ENG2 | ENG3 | ENG4 | ENG5 | Units |
|---|---|---|---|---|---|---|
| Fuel | Diesel | Diesel | Diesel | Diesel | Diesel | -- |
| Maximum Power Output[1] | 564 | 335 | 172 | 37 | 37 | kW, output |
| | 757 | 449 | 231 | 49 | 49 | bhp, output |
| Potential Operation[2] | 500 | 500 | 500 | 500 | 500 | hr/yr |
| Heating Value of Diesel[3] | 19,300 | 19,300 | 19,300 | 19,300 | 19,300 | Btu/lb |
| Power Conversion[3] | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | Btu/hp-hr |

1. Manufacturer specified parameters.
2. Emergency engines operate a maximum of 500 hours per year.
3. Conversion factor and heating value for diesel fuel as noted in AP-42, Section 3.3, Table 3.3-1 footnotes.

**Table B-17. Emergency Generator Engines Emission Factors**

| Pollutant | ENG1 NSPS Subpart IIII Emission Standards[1,2] (g/kW-hr) | ENG2 Subpart IIII Emission Standards[1,2] (g/kW-hr) | ENG3 NSPS Subpart IIII Emission Standards[1,2] (g/kW-hr) | ENG4 and ENG5 NSPS Subpart IIII Emission Standards[1,2] (g/kW-hr) | AP-42 Engine Emission Factor[4] (lb/hp-hr) | AP-42 Engine Emission Factor[4] (lb/MMBtu) | 40 CFR Part 98 Emission Factor[5,6] (lb/MMBtu) | 40 CFR Part 98 Emission Factor[5,6] (kg/MMBtu) |
|---|---|---|---|---|---|---|---|---|
| CO | 3.50 | 3.50 | 3.50 | 5.00 | -- | -- | -- | -- |
| $NO_X$ | 6.40 | 4.00 | 4.00 | 4.70 | -- | -- | -- | -- |
| Filterable PM | 0.20 | 0.20 | 0.20 | 0.40 | -- | -- | -- | -- |
| Total PM[3] | -- | -- | -- | -- | 2.20E-03 | | | |
| Total $PM_{10}$[3] | -- | -- | -- | -- | 2.20E-03 | -- | -- | -- |
| Total $PM_{2.5}$[3] | -- | -- | -- | -- | 2.20E-03 | -- | -- | -- |
| $SO_2$ | 1.09E-05 lb/hp-hr | | | | -- | -- | -- | -- |
| VOC | -- | -- | -- | -- | 2.47E-03 | -- | -- | -- |
| $CO_2$ | -- | -- | -- | -- | -- | -- | 163.05 | 73.96 |
| $CH_4$ | -- | -- | -- | -- | -- | -- | 6.61E-03 | 3.00E-03 |
| $N_2O$ | -- | -- | -- | -- | -- | -- | 1.32E-03 | 6.00E-04 |
| $CO_2e$ | -- | -- | -- | -- | -- | -- | 163.61 | 74.21 |
| Total HAP | -- | -- | -- | -- | -- | 3.79E-03 | -- | -- |
| Benzene | -- | -- | -- | -- | -- | 9.33E-04 | -- | -- |
| Toluene | -- | -- | -- | -- | -- | 4.09E-04 | -- | -- |
| Xylenes | -- | -- | -- | -- | -- | 2.85E-04 | -- | -- |
| 1,3-Butadiene | -- | -- | -- | -- | -- | 3.91E-05 | -- | -- |
| Formaldehyde | -- | -- | -- | -- | -- | 1.18E-03 | -- | -- |
| Acetaldehyde | -- | -- | -- | -- | -- | 7.67E-04 | -- | -- |
| Acrolein | -- | -- | -- | -- | -- | 9.25E-05 | -- | -- |
| Naphthalene | -- | -- | -- | -- | -- | 8.48E-05 | -- | -- |

1. Emission factors from NSPS Subpart IIII emission standards for specific engine. It is conservatively assumed that emission standards for NMHC+NOx as NOx emission rate.
2. Sulfur content (15 ppmv) in accordance with 40 CFR 60.4207(b) as required by NSPS Subpart IIII.
3. All PM is assumed to have a diameter of less than one micron. Additionally, there is no CPM factor available; thus, PM = $PM_{10}$ = $PM_{2.5}$. These emission factors are from AP-42 Table 3.3-1.
4. HAP emission factors from AP-42, Table 3.3-2.
5. Based on EPA default factors in 40 CFR Part 98 Subpart C Tables C-1 and C-2, effective January 1, 2014, for Distillate Fuel Oil No. 2 (Petroleum Products).
6. Emissions for Greenhouse Gases (GHGs) are denoted as $CO_2$ equivalent ($CO_2e$), which is the sumproduct of each GHG and its respective global warming potentials (GWP) for a

| | |
|---|---|
| $CO_2$ | 1 |
| $CH_4$ | 25 |
| $N_2O$ | 298 |

**Table B-18. Emergency Generator Engines Criteria Pollutant & GHG Potential Emissions[1,2]**

| Pollutant | ENG1 Emissions (lb/hr) | ENG1 Emissions (tpy) | ENG2 Emissions (lb/hr) | ENG2 Emissions (tpy) | ENG3 Emissions (lb/hr) | ENG3 Emissions (tpy) | ENG4 Emissions (lb/hr) | ENG4 Emissions (tpy) | ENG5 Emissions (lb/hr) | ENG5 Emissions (tpy) |
|---|---|---|---|---|---|---|---|---|---|---|
| CO | 4.36 | 1.09 | 2.58 | 0.65 | 1.33 | 0.33 | 0.40 | 0.10 | 0.40 | 0.10 |
| $NO_X$ | 7.96 | 1.99 | 2.95 | 0.74 | 1.52 | 0.38 | 0.38 | 9.47E-02 | 0.38 | 9.47E-02 |
| $N_2O$ | 7.01E-03 | 1.75E-03 | 4.16E-03 | 1.04E-03 | 2.14E-03 | 5.35E-04 | 4.54E-04 | 1.13E-04 | 4.54E-04 | 1.13E-04 |
| Filterable PM | 0.25 | 6.22E-02 | 0.15 | 3.69E-02 | 7.60E-02 | 1.90E-02 | 3.22E-02 | 8.06E-03 | 3.22E-02 | 8.06E-03 |
| Total PM | 1.67 | 0.42 | 0.99 | 0.25 | 0.51 | 0.13 | 0.11 | 2.70E-02 | 0.11 | 2.70E-02 |
| Total $PM_{10}$ | 1.67 | 0.42 | 0.99 | 0.25 | 0.51 | 0.13 | 0.11 | 2.70E-02 | 0.11 | 2.70E-02 |
| Total $PM_{2.5}$ | 1.67 | 0.42 | 0.99 | 0.25 | 0.51 | 0.13 | 0.11 | 2.70E-02 | 0.11 | 2.70E-02 |
| $SO_2$[3] | 8.24E-03 | 2.06E-03 | 4.89E-03 | 1.22E-03 | 2.51E-03 | 6.28E-04 | 5.33E-04 | 1.33E-04 | 5.33E-04 | 1.33E-04 |
| VOC | 1.87 | 0.47 | 1.11 | 0.28 | 0.57 | 0.14 | 0.12 | 3.03E-02 | 0.12 | 3.03E-02 |
| $CO_2$ | 864.0 | 216.0 | 512.5 | 128.1 | 263.7 | 65.91 | 55.93 | 13.98 | 55.93 | 13.98 |
| $CH_4$ | 3.50E-02 | 8.76E-03 | 2.08E-02 | 5.20E-03 | 1.07E-02 | 2.67E-03 | 2.27E-03 | 5.67E-04 | 2.27E-03 | 5.67E-04 |
| $CO_2e$ | 867.0 | 216.7 | 514.2 | 128.6 | 264.6 | 66.14 | 56.12 | 14.03 | 56.12 | 14.03 |

1. Emissions calculated as follows:
   Potential Emissions (tpy) = Emission Factor (g/kW-hr) x Rated Capacity (kW) / Conversion (453.6 g/lb) x Annual Operation (hr/yr) / 2,000 (lb/ton)
   Potential Emissions (tpy) = Emission Factor (g/hp-hr) x Rated Capacity (hp) / Conversion (453.6 g/lb) x Annual Operation (hr/yr) / 2,000 (lb/ton)
   Potential Emissions (tpy) = Emission Factor (lb/hp-hr) x Rated Capacity (hp) x Annual Operation (hr/yr) / 2,000 (lb/ton)
   Potential Emissions (tpy) = Emission Factor (lb/MMBtu) x Rated Capacity (hp) x Fuel Factor (MMBtu/hp-hr) x Annual Operation (hr/yr) / 2,000 (lb/ton)
   Fuel Factor (MMBtu/hp-hr) = 0.007 Per AP-42 Table 3.3-1 Footnote a.
2. Potential Emissions (lb/hr) = Potential Emissions (tpy) x 2,000 lb/ton / Annual Operation (hr/yr)
3. $SO_2$ emissions are calculated as follows:
Emissions (lb/hr) = Emission Factor (lb/hp-hr) * Engine Capacity (hp)
Annual Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton).

**Table B-19. Emergency Generator Engines Potential HAP Emissions[2,3]**

| Pollutant | Emission Factor[1] (lb/hp-hr) | Emission Factor[1] (lb/MMBtu) | ENG1 Potential (lb/hr) | ENG1 Potential (tpy) | ENG2 Potential (lb/hr) | ENG2 Potential (tpy) | ENG3 Potential (lb/hr) | ENG3 Potential (tpy) | ENG4 Potential (lb/hr) | ENG4 Potential (tpy) | ENG5 Potential (lb/hr) | ENG5 Potential (tpy) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetaldehyde | 5.37E-06 | 7.67E-04 | 4.06E-03 | 1.02E-03 | 2.41E-03 | 6.03E-04 | 1.24E-03 | 3.10E-04 | 2.63E-04 | 6.58E-05 | 2.63E-04 | 6.58E-05 |
| Acrolein | 6.48E-07 | 9.25E-05 | 4.90E-04 | 1.23E-04 | 2.91E-04 | 7.27E-05 | 1.50E-04 | 3.74E-05 | 3.17E-05 | 7.93E-06 | 3.17E-05 | 7.93E-06 |
| Benzene | 6.53E-06 | 9.33E-04 | 4.94E-03 | 1.24E-03 | 2.93E-03 | 7.33E-04 | 1.51E-03 | 3.77E-04 | 3.20E-04 | 8.00E-05 | 3.20E-04 | 8.00E-05 |
| Formaldehyde | 8.26E-06 | 1.18E-03 | 6.25E-03 | 1.56E-03 | 3.71E-03 | 9.27E-04 | 1.91E-03 | 4.77E-04 | 4.05E-04 | 1.01E-04 | 4.05E-04 | 1.01E-04 |
| Toluene | 2.86E-06 | 4.09E-04 | 2.17E-03 | 5.42E-04 | 1.29E-03 | 3.21E-04 | 6.61E-04 | 1.65E-04 | 1.40E-04 | 3.51E-05 | 1.40E-04 | 3.51E-05 |
| Xylenes | 2.00E-06 | 2.85E-04 | 1.51E-03 | 3.78E-04 | 8.96E-04 | 2.24E-04 | 4.61E-04 | 1.15E-04 | 9.78E-05 | 2.44E-05 | 9.78E-05 | 2.44E-05 |
| 1,3 Butadiene | 2.74E-07 | 3.91E-05 | 2.07E-04 | 5.18E-05 | 1.23E-04 | 3.07E-05 | 6.32E-05 | 1.58E-05 | 1.34E-05 | 3.35E-06 | 1.34E-05 | 3.35E-06 |
| Total PAH | 1.18E-06 | 1.68E-04 | 8.90E-04 | 2.23E-04 | 5.28E-04 | 1.32E-04 | 2.72E-04 | 6.79E-05 | 5.76E-05 | 1.44E-05 | 5.76E-05 | 1.44E-05 |
| Naphthalene | 5.94E-07 | 8.48E-05 | 4.49E-04 | 1.12E-04 | 2.67E-04 | 6.66E-05 | 1.37E-04 | 3.43E-05 | 2.91E-05 | 7.27E-06 | 2.91E-05 | 7.27E-06 |
| Acenaphthylene | 3.54E-08 | 5.06E-06 | 2.68E-05 | 6.70E-06 | 1.59E-05 | 3.98E-06 | 8.18E-06 | 2.05E-06 | 1.74E-06 | 4.34E-07 | 1.74E-06 | 4.34E-07 |
| Acenaphthene | 9.94E-09 | 1.42E-06 | 7.52E-06 | 1.88E-06 | 4.46E-06 | 1.12E-06 | 2.30E-06 | 5.74E-07 | 4.87E-07 | 1.22E-07 | 4.87E-07 | 1.22E-07 |
| Fluorene | 2.04E-07 | 2.92E-05 | 1.55E-04 | 3.87E-05 | 9.18E-05 | 2.29E-05 | 4.72E-05 | 1.18E-05 | 1.00E-05 | 2.50E-06 | 1.00E-05 | 2.50E-06 |
| Phenanthrene | 2.06E-07 | 2.94E-05 | 1.56E-04 | 3.89E-05 | 9.24E-05 | 2.31E-05 | 4.75E-05 | 1.19E-05 | 1.01E-05 | 2.52E-06 | 1.01E-05 | 2.52E-06 |
| Anthracene | 1.31E-08 | 1.87E-06 | 9.91E-06 | 2.48E-06 | 5.88E-06 | 1.47E-06 | 3.02E-06 | 7.56E-07 | 6.41E-07 | 1.60E-07 | 6.41E-07 | 1.60E-07 |
| Fluoranthene | 5.33E-08 | 7.61E-06 | 4.03E-05 | 1.01E-05 | 2.39E-05 | 5.98E-06 | 1.23E-05 | 3.08E-06 | 2.61E-06 | 6.53E-07 | 2.61E-06 | 6.53E-07 |
| Pyrene | 3.35E-08 | 4.78E-06 | 2.53E-05 | 6.33E-06 | 1.50E-05 | 3.76E-06 | 7.73E-06 | 1.93E-06 | 1.64E-06 | 4.10E-07 | 1.64E-06 | 4.10E-07 |
| Benzo(a)anthracene | 1.18E-08 | 1.68E-06 | 8.90E-06 | 2.23E-06 | 5.28E-06 | 1.32E-06 | 2.72E-06 | 6.79E-07 | 5.76E-07 | 1.44E-07 | 5.76E-07 | 1.44E-07 |
| Chrysene | 2.47E-09 | 3.53E-07 | 1.87E-06 | 4.68E-07 | 1.11E-06 | 2.77E-07 | 5.71E-07 | 1.43E-07 | 1.21E-07 | 3.03E-08 | 1.21E-07 | 3.03E-08 |
| Benzo(b)fluoranthene | 6.94E-10 | 9.91E-08 | 5.25E-07 | 1.31E-07 | 3.11E-07 | 7.79E-08 | 1.60E-07 | 4.01E-08 | 3.40E-08 | 8.50E-09 | 3.40E-08 | 8.50E-09 |
| Benzo(k)fluoranthene | 1.09E-09 | 1.55E-07 | 8.21E-07 | 2.05E-07 | 4.87E-07 | 1.22E-07 | 2.51E-07 | 6.27E-08 | 5.32E-08 | 1.33E-08 | 5.32E-08 | 1.33E-08 |
| Benzo(a)pyrene | 1.32E-09 | 1.88E-07 | 9.96E-07 | 2.49E-07 | 5.91E-07 | 1.48E-07 | 3.04E-07 | 7.60E-08 | 6.45E-08 | 1.61E-08 | 6.45E-08 | 1.61E-08 |
| Indeno(1,2,3-cd)pyrene | 2.63E-09 | 3.75E-07 | 1.99E-06 | 4.97E-07 | 1.18E-06 | 2.95E-07 | 6.06E-07 | 1.52E-07 | 1.29E-07 | 3.22E-08 | 1.29E-07 | 3.22E-08 |
| Dibenz(a,h)anthracene | 4.08E-09 | 5.83E-07 | 3.09E-06 | 7.72E-07 | 1.83E-06 | 4.58E-07 | 9.43E-07 | 2.36E-07 | 2.00E-07 | 5.00E-08 | 2.00E-07 | 5.00E-08 |
| Benzo(g,h,l)perylene | 3.42E-09 | 4.89E-07 | 2.59E-06 | 6.48E-07 | 1.54E-06 | 3.84E-07 | 7.91E-07 | 1.98E-07 | 1.68E-07 | 4.19E-08 | 1.68E-07 | 4.19E-08 |
| | | **Total HAP** | **2.05E-02** | **5.13E-03** | **1.22E-02** | **3.04E-03** | **6.26E-03** | **1.57E-03** | **1.33E-03** | **3.32E-04** | **1.33E-03** | **3.32E-04** |
| | | **Max Individual HAP[4]** | **6.25E-03** | **1.56E-03** | **3.71E-03** | **9.27E-04** | **1.91E-03** | **4.77E-04** | **4.05E-04** | **1.01E-04** | **4.05E-04** | **1.01E-04** |

1. Emission factors from AP-42 Section 3.3 (Gasoline and Diesel Industrial Engines), Table 3.3-2 (10/96). Emission factors in lb/MMBtu were converted to lb/hp-hr by multiplying the power conversion factor of 7,000 Btu/hp-hr and 1 MMBtu/1,000,000 Btu.
2. Short-term emissions are calculated as follows:
Emissions (lb/hr) = Emission Factor (lb/hp-hr) * Engine Capacity (hp).
3. Annual emissions are calculated as follows:
Annual Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton).
4. Maximum individual HAP is formaldehyde.

### Table B-20. Fire Pump Operating Parameters

| Parameter | FWP1 | Units |
|---|---|---|
| Fuel | Diesel | |
| Maximum Power Output[1] | 192 | bhp |
| Potential Operation[2] | 500 | hr/yr |
| Heating Value of Diesel[3] | 19,300 | Btu/lb |
| Power Conversion[3] | 7,000 | Btu/hp-hr |

1. Manufacturer specified parameters.
2. Engine will operate a maximum of 500 hrs/yr, per EPA guidance.
3. Conversion factor for diesel fuel as noted in AP-42, Section 3.3, Table 3.3-1 footnote.

### Table B-21. Fire Pump Criteria Pollutant & GHG Potential Emissions

| Pollutant | Emission Factor[6] (lb/hp-hr) | Emission Factor[6] (lb/MMBtu) | FWP1 Potential Emissions[7,8] (lb/hr) | FWP1 Potential Emissions[7,8] (tpy) |
|---|---|---|---|---|
| $NO_X$[1] | 6.58E-03 | -- | 1.26 | 0.32 |
| VOC | 2.47E-03 | -- | 0.47 | 0.12 |
| CO[1] | 5.76E-03 | -- | 1.11 | 0.28 |
| Filterable PM[1] | 3.29E-04 | -- | 6.32E-02 | 1.58E-02 |
| Total PM[2] | 2.20E-03 | -- | 0.42 | 0.11 |
| Total $PM_{10}$[2] | 2.20E-03 | -- | 0.42 | 0.11 |
| Total $PM_{2.5}$[2] | 2.20E-03 | -- | 0.42 | 0.11 |
| $SO_2$[3] | 1.09E-05 | -- | 2.09E-03 | 5.22E-04 |
| $CO_2$ | 1.15 | -- | 220.8 | 55.20 |
| $CH_4$[4] | 4.63E-05 | 6.61E-03 | 8.89E-03 | 2.22E-03 |
| $N_2O$[4] | 9.26E-06 | 1.32E-03 | 1.78E-03 | 4.44E-04 |
| $CO_2e$[5] | 1.15 | -- | 221.6 | 55.39 |

1. Fire pump PM, CO, $NO_X$ emissions factors are based on NSPS IIII emission limit.

| | NSPS IIII Emission Limit | |
|---|---|---|
| $NO_X$ = | 4 | g/kW-hr |
| NMHC = | | g/kW-hr |
| CO = | 3.5 | g/kW-hr |
| Filterable PM = | 0.2 | g/kW-hr |

Emission factors were converted to lb/hp-hr by dividing 608 per AP-42, Section 3.3, Table 3.3-1 footnote.

2. All PM is assumed to have a diameter of less than one micron. Additionally, there is no CPM factor available; thus, Total PM = Total $PM_{10}$ = Total $PM_{2.5}$.
3. Sulfur content (15 ppmv) in accordance with 40 CFR 60.4207(b) as required by NSPS Subpart IIII.
4. $CH_4$ and $N_2O$ factors are from 40 CFR Part 98, Table C-2 for petroleum fuels. Factors were converted from kg/MMBtu to lb/MMBtu.

| | | |
|---|---|---|
| $CH_4$ = | 0.003 | kg/MMBtu |
| $N_2O$ = | 0.0006 | kg/MMBtu |

5. $CO_2e$ is calculated using Global Warming Potentials (GWPs) from 40 CFR Part 98, Subpart A, Table A-1 effective

| | |
|---|---|
| $CO_2$ | 1 |
| $CH_4$ | 25 |
| $N_2O$ | 298 |

6. Otherwise emission factors from AP-42 Section 3.3 (Gasoline and Diesel Industrial Engines), Table 3.3-1 (10/96). Emission factors in lb/MMBtu were converted to lb/hp-hr by multiplying the power conversion factor of 7,000 Btu/hp-hr and 1MMBtu/1,000,000 Btu.
7. Short-term emissions are calculated as follows:
Emissions (lb/hr) = Emission Factor (lb/hp-hr) * Engine Capacity (hp).
8. Annual emissions are calculated as follows:
Annual Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton).

**Table B-22. Fire Pump Potential HAP Emissions**

| Pollutant | Emission Factor[1] (lb/hp-hr) | Emission Factor[1] (lb/MMBtu) | FWP1 Potential Emissions[2,3] (lb/hr) | FWP1 Potential Emissions[2,3] (tpy) |
|---|---|---|---|---|
| Acetaldehyde | 5.37E-06 | 7.67E-04 | 1.03E-03 | 2.58E-04 |
| Acrolein | 6.48E-07 | 9.25E-05 | 1.24E-04 | 3.11E-05 |
| Benzene | 6.53E-06 | 9.33E-04 | 1.25E-03 | 3.13E-04 |
| Formaldehyde | 8.26E-06 | 1.18E-03 | 1.59E-03 | 3.96E-04 |
| Toluene | 2.86E-06 | 4.09E-04 | 5.50E-04 | 1.37E-04 |
| Xylenes | 2.00E-06 | 2.85E-04 | 3.83E-04 | 9.58E-05 |
| 1,3 Butadiene | 2.74E-07 | 3.91E-05 | 5.26E-05 | 1.31E-05 |
| Naphthalene | 5.94E-07 | 8.48E-05 | 1.14E-04 | 2.85E-05 |
| Acenaphthylene | 3.54E-08 | 5.06E-06 | 6.80E-06 | 1.70E-06 |
| Acenaphthene | 9.94E-09 | 1.42E-06 | 1.91E-06 | 4.77E-07 |
| Fluorene | 2.04E-07 | 2.92E-05 | 3.92E-05 | 9.81E-06 |
| Phenanthrene | 2.06E-07 | 2.94E-05 | 3.95E-05 | 9.88E-06 |
| Anthracene | 1.31E-08 | 1.87E-06 | 2.51E-06 | 6.28E-07 |
| Fluoranthene | 5.33E-08 | 7.61E-06 | 1.02E-05 | 2.56E-06 |
| Pyrene | 3.35E-08 | 4.78E-06 | 6.42E-06 | 1.61E-06 |
| Benzo(a)anthracene | 1.18E-08 | 1.68E-06 | 2.26E-06 | 5.64E-07 |
| Chrysene | 2.47E-09 | 3.53E-07 | 4.74E-07 | 1.19E-07 |
| Benzo(b)fluoranthene | 6.94E-10 | 9.91E-08 | 1.33E-07 | 3.33E-08 |
| Benzo(k)fluoranthene | 1.09E-09 | 1.55E-07 | 2.08E-07 | 5.21E-08 |
| Benzo(a)pyrene | 1.32E-09 | 1.88E-07 | 2.53E-07 | 6.32E-08 |
| Indeno(1,2,3-cd)pyrene | 2.63E-09 | 3.75E-07 | 5.04E-07 | 1.26E-07 |
| Dibenz(a,h)anthracene | 4.08E-09 | 5.83E-07 | 7.84E-07 | 1.96E-07 |
| Benzo(g,h,l)perylene | 3.42E-09 | 4.89E-07 | 6.57E-07 | 1.64E-07 |
| | | **Total HAP** | **5.21E-03** | **1.30E-03** |
| | | **Max Individual HAP[4]** | **1.59E-03** | **3.96E-04** |

1. Emission factors from AP-42 Section 3.3 (Gasoline and Diesel Industrial Engines), Table 3.3-2 (10/96). Emission factors in lb/MMBtu were converted to lb/hp-hr by multiplying the power conversion factor of 7,000 Btu/hp-hr and 1MMBtu/1,000,000 Btu.
2. Short-term emissions are calculated as follows:
Emissions (lb/hr) = Emission Factor (lb/hp-hr) * Engine Capacity (hp).
3. Annual emissions are calculated as follows:
Annual Emissions (tpy) = Hourly Emissions (lb/hr) * Annual Operation (hr/yr) / 2,000 (lb/ton).
4. Maximum individual HAP is formaldehyde.

# APPENDIX C: MDEQ AIR PERMIT APPLICATION FORMS

| FORM 5 | MDEQ | MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY APPLICATION FOR AIR POLLUTION CONTROL PERMIT |
|---|---|---|

**Facility (Agency Interest) Information** — **Section A**

## 1. Name, Address, and Location of Facility

A. Owner/Company Name: Pinnacle Renewable Energy Inc.

B. Facility Name (if different than A. above): Newton, MS Facility

C. Facility Air Permit No. (if known): ____

D. Agency Interest No. (if known): ____

E. Physical Address
1. Street Address: 615 Coliseum Dr
2. City: Newton — 3. State: MS
4. County: Newton — 5. Zip Code: 39345
6. Telephone No. TBD — 7. Fax No. TBD

F. Mailing Address *(if different from physical address)*
1. Street Address or P.O. Box: ____
2. City: ____
3. State: ____ — 4. Zip Code: ____

G. Latitude/Longitude Data
1. Collection Point *(check one)*
[ ] Plant Entrance [x] Other: Facility Site
2. Method of Collection *(check one)*
[ ] GPS Specify coordinate system (NAD 83, etc.) ____
[ ] Map Interpolation (Google Earth etc.) [ ] Other: ____
3. Latitude (degrees/minutes/seconds): 32 degrees 21 minutes 38.90 seconds
4. Longitude (degrees/minutes/seconds): 89 degrees 8 minutes 2.88 seconds
5. Elevation: 388 feet

H. SIC/NAICS Codes *(primary code listed first)*
SIC: 2499
NAICS: 321999
*(NAICS Code should correspond with the SIC Code directly above.)*

## 2. Name and Address of Facility Contact

A. Name Paul Pawlowski — Title: Director - Energy & Environment

B. Mailing Address
1. Street Address or P.O. Box: 3600 Lysander Lane, Suite 350
2. City: Richmond — 3. State: British Columbia
4. Zip Code: V7B 1C3 — 5. Email: paul.pawlowski@pinnaclepellet.com
6. Telephone No. 1 (604) 270-9613 Ext. 2022 — 7. Fax No. ____

## 3. Name and Address of Air Contact *(if different from Facility Contact)*

A. Name: Paul Pawlowski — Title: Director - Energy & Environment

B. Mailing Address

1. Street Address: 3600 Lysander Lane, Suite 350
2. City: Richmond — 3. State: British Columbia
4. County: — 5. Zip Code: V7B 1C3
6. Telephone No. 1 (604) 270-9613 Ext. 2022 — 7. Fax No.

## 4. Name and Address of the Responsible Official for the Facility

The Responsible Official is defined as one of the following:

a. For a corporation, a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and the facilities employ more than 250 persons or have gross annual sales or expenditures exceeding $ 25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated in accordance with corporate procedures.

b. For a partnership or sole proprietorship: a general partner or the proprietor, respectively.

c. For a municipality, state, federal, or other public agency: either a principal executive officer or ranking elected official. For purposes of these regulations, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of EPA). A principal executive officer of a military facility includes the facility commander, chief executive officer, or any other similar person who performs similar policy or decision-making functions for the institution.

A. Name: Paul Pawlowski — Title : Director - Energy & Environment

B. Mailing Address

1. Street Address: 3600 Lysander Lane, Suite 350
2. City : Richmond — 3. State: British Columbia
4. Zip Code: V7B 1C3 — 5. Email: paul.pawlowski@pinnaclepellet.com
6. Telephone No. 1 (604) 270-9613 Ext. 2022 — 7. Fax No.

C. Is the person above a duly authorized representative? ☐ Yes ☐ No

If yes, has written notification of such authorization been submitted to MDEQ?
☐ Yes ☒ No ☐ Request for authorization is attached

## 5. Type of Permit Application *(Check all that apply)*

**State Permit to Construct (i.e., non-PSD or PSD avoidance)**

[X] Initial Application  [ ] Modification

**New Source Review (NSR) Permit to Construct (includes both Prevention of Significant Deterioration (PSD) and Nonattainment)**

[ ] Initial Application  [ ] Modification

**Title V Operating Permit**

[ ] Initial Application

[ ] Re-issuance: Are any modification to the permit/facility being requested?  [ ] Yes [ ] No

*If yes, provide a separate sheet identifying the modification(s) and resulting change to emissions.*

[ ] Modification (*Specify type* ): [ ] Significant [ ] Minor [ ] Administrative

**Synthetic Minor Operating Permit *(Appendix B must be completed and attached.)***

[ ] Initial Application

[ ] Re-issuance: Are any modification to the permit/facility being requested?  [ ] Yes [ ] No

[ ] Modification

**State Permit to Operate a Significant Minor Source *(defined in APC-S-2, Section I.C.25)***

[ ] Initial Application

[ ] Re-issuance: Are any modification to the permit/facility being requested?  [ ] Yes [ ] No

[ ] Modification

**True Minor Determination**

[ ] Uncontrolled potential to emit air pollutants is below the Title V thresholds

## 6. Process/Product Details

A. List Significant Raw Materials (*if applicable* ):
Green sawdust, shavings, bark and wood chips

B. List All Products (*if applicable* ):
Fuel pellets

C. Brief Description of Principal Process(es):
Pinnacle is proposing to construct and operate a greenfield wood pellet facility. The Newton Facility will process wood chips, sawdust, and other wood materials into fuel pellets to produce a source of alternative renewable fuel for solid fuel combustion sources. Operations will include a wood chips receiving and processing area, bark/shavings receiving and storage, one (1) dryer, four (4) hammermills, nine (9) wood pellet production and cooling lines, wood pellets storage, and a truck loadout area. Future operations may include a debarker and a chipper for the purpose of processing whole logs. Potential emissions from future debarking and cutting operations associated with processing whole logs are included in this application.

## 6. Process/Product Details (continued)

D. Maximum Throughput for Raw Material(s) (*if applicable* ):

| Raw Materials | Throughput | Units |
|---|---|---|
| Green sawdust, shavings, bark and wood chips | 880,000 | tpy |
| | | |
| | | |
| | | |

E. Maximum Throughput for Principal Product(s) (*if applicable* ):

| Product | Throughput | Units |
|---|---|---|
| Fuel pellets | 440,000 | tpy |
| | | |
| | | |
| | | |

## 7. Facility Operating Information

A. Number of employees at the facility: ________

| | Average Actual | Maximum Potential |
|---|---|---|
| B. Hours per day the facility will operate: | 24 | 24 |
| C. Days per week the facility will operate: | 7 | 7 |
| D. Weeks per year the facility will operate: | 52 | 52 |
| E. Months the facility will operate: | 12 | 12 |

## 8. Maps

A. Attach a topographical map of the area extending to at least 1/2 mile beyond the property boundaries. The map must show the outline of the property boundaries.

B. Attach a site map/diagram showing the outline of the property, and outline of all buildings and roadways on the site, and the location of each significant air emission source.

## 9. Zoning

A. Is the facility (either existing or proposed) located in accordance with any applicable city and/or county zoning ordinances? If no, please explain.

Yes

B. Is the facility (either existing or proposed) required to obtain any zoning variance to locate/ expand the facility at this site? If yes, please explain.

No

## 10. Risk management Plan

A. Is the facility required to develop and register a risk management plan pursuant to Section 112(r), regulated under 40 CFR Part 68? [ ] Yes [X] No

B. If yes, to whom was the plan submitted? ____________________

## 11. *Is confidential information being submitted with this application?* [ ] Yes [X] No

If so, please follow the procedures outlined in the Mississippi Code Ann. Sections 49-17-39 and 17-17-27(6), as outlined in MCEQ-2-"Regulation regarding the review and reproduction of public records".

## 12. MS Secretary of State Registration / Certificate of Good Standing

No permit will be issued to a company that is not authorized to conduct business in Mississippi. If the company applying for the permit is a corporation, limited liability company, a partnership or a business trust, the application package should include proof of registration with the Mississippi Secretary of State and/or a copy of the company's Certificate of Good Standing. The name listed on the permit will include the company name as it is registered with the Mississippi Secretary of State.

It should be noted that for an application submitted in accordance with 11 Miss. Admin. Code Pt. 2, R. 2.8.B. to renew a State Permit to Operate or in accordance with 11 Miss. Admin. Code Pt. 2, R. 6.2.A(1)(c). to renew a Title V Permit to be considered timely and complete, the applicant shall be registered and in good standing with the Mississippi Secretary of State to conduct business in Mississippi.

| 13. | **Certification** |
|---|---|

*Note: If approved by the MDEQ, a duly authorized representative (DAR) may sign the air permit application. The DAR must be listed in Section 4 of this application.*

*I certify to the best of knowledge and belief formed after reasonable inquiry; the statements and information in this application are true, complete, and accurate, and that as a responsible official, my signature shall constitute an agreement that the applicant assumes the responsibility for any alteration, additions, or changes in operation that may be necessary to achieve and maintain compliance with all applicable Rules and Regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.*

P. Pawlowski
**Signature of Responsible Official/DAR**

Nov. 27/2019
**Date**

Paul Pawlowski
**Printed Name**

Director - Energy & Environment
**Title**

## 14. Required Sections

For the sections below, indicate the number that have been completed for each section as part of the application.

| | | | | | |
|---|---|---|---|---|---|
| Section A | 1 | Section L1 | 2 | Section M5 | |
| Section B | 5 | Section L2 | | Section M6 | |
| Section C | 1 | Section L3 | | Section M7 | |
| Section D | 6 | Section L4 | 2 | Section M8 | |
| Section E | 6 | Section L5 | | Section M9 | |
| Section F | | Section L6 | 1 | Section M10 | |
| Section G | | Section L7 | | Section N | 1 |
| Section H | | Section M1 | | Appendix A | |
| Section I | | Section M2 | | Appendix B | |
| Section J | | Section M3 | | Appendix C | |
| Section K | | Section M4 | | | |

The following permit applications must contain the specified sections, at a minimum, to be considered administratively complete.

| Permit Type | Section | | | | Appendix | | |
|---|---|---|---|---|---|---|---|
| | A | B | M | N | A | B | C |
| State Permit to Construct | X | X | | X | | | |
| New Source Review Permit | | | | | | | |
| Title V Operating Permit | | | | | | | |
| Synthetic Minor Operating Permit | | | | | | | |
| State Permit to Operate | | | | | | | |
| True Minor Determination | | | | | | | |

## Section B.1: Maximum Uncontrolled Emissions (under normal operating conditions)

Maximum Uncontrolled Emissions are the emissions at maximum capacity and prior to (in the absence of) pollution control, emission-reducing process equipment, or any other emission reduction. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum plant capacity without pollution controls for 8760 hours per year, unless otherwise approved by the Department. List Hazardous Air Pollutants (HAP) in Section B.3 and GHGs in Section B.4. Emission Point numbering must be consistent throughout the application package and, for existing emission points, should match any MDEQ ID's in the current permit. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Emissions > 0.01 TPY must be included. Please do not change the column widths on this table.

| Emission | TSP[1] (PM) | | PM-10[1] | | PM-2.5[1] | | $SO_2$ | | NOx | | CO | | VOC | | TRS[2] | | Lead | | Total HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Point ID** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** |
| RD | 68.80 | 301.3 | 68.80 | 301.3 | 68.80 | 301.3 | 4.25 | 18.62 | 22.84 | 100.1 | 35.97 | 157.5 | 219.2 | 960 | -- | -- | 4.25 | 18.62 | 21.31 | 93.3 |
| HM1-HM4 | 85.71 | 375.4 | 85.71 | 375.4 | 85.71 | 375.4 | -- | -- | -- | -- | -- | -- | 30.88 | 135.2 | -- | -- | -- | -- | 0.80 | 3.52 |
| PL1 - PL9 | 85.71 | 375.4 | 85.71 | 375.4 | 85.71 | 375.4 | -- | -- | -- | -- | -- | -- | 148.6 | 650.9 | -- | -- | -- | -- | 0.20 | 0.88 |
| PSS1 | 1.26 | 5.50 | 0.32 | 1.39 | 5.53E-02 | 0.24 | -- | -- | -- | -- | -- | -- | 1.39 | 6.10 | -- | -- | -- | -- | 0.20 | 0.88 |
| TLS | 4.32 | 18.92 | 1.46 | 6.38 | 0.25 | 1.08 | -- | -- | -- | -- | -- | -- | 1.39 | 6.10 | -- | -- | -- | -- | 0.20 | 0.88 |
| ENG1 | 0.25 | 6.22E-02 | 1.67 | 0.42 | 1.67 | 0.42 | 8.24E-03 | 2.06E-03 | 7.96 | 1.99 | 4.36 | 1.09 | 1.87 | 0.47 | -- | -- | -- | -- | 2.05E-02 | 5.13E-03 |
| ENG2 | 0.15 | 3.69E-02 | 0.99 | 0.25 | 0.99 | 0.25 | 4.89E-03 | 1.22E-03 | 2.95 | 0.74 | 2.58 | 0.65 | 1.11 | 0.28 | -- | -- | -- | -- | 1.22E-02 | 3.04E-03 |
| ENG3 | 7.60E-02 | 1.90E-02 | 0.51 | 0.13 | 0.51 | 0.13 | 2.51E-03 | 6.28E-04 | 1.52 | 0.38 | 1.33 | 0.33 | 0.57 | 0.14 | -- | -- | -- | -- | 6.26E-03 | 1.57E-03 |
| ENG4 | 3.22E-02 | 8.06E-03 | 0.11 | 2.70E-02 | 0.11 | 2.70E-02 | 5.33E-04 | 1.33E-04 | 0.38 | 9.47E-02 | 0.40 | 0.10 | 0.12 | 3.03E-02 | -- | -- | -- | -- | 1.33E-03 | 3.32E-04 |
| ENG5 | 3.22E-02 | 8.06E-03 | 0.11 | 2.70E-02 | 0.12 | 3.03E-02 | 5.33E-04 | 1.33E-04 | 0.38 | 9.47E-02 | 0.40 | 0.10 | 0.12 | 3.03E-02 | -- | -- | -- | -- | 1.33E-03 | 3.32E-04 |
| FWP1 | 6.32E-02 | 1.58E-02 | 0.42 | 0.11 | 0.42 | 0.11 | 2.09E-03 | 5.22E-04 | 1.26 | 0.32 | 1.11 | 0.28 | 0.47 | 0.12 | -- | -- | -- | -- | 5.21E-03 | 1.30E-03 |
| RTO1 | -- | -- | -- | -- | -- | -- | 5.88E-03 | 2.58E-02 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1.85E-02 | 0.08 |
| RTO2 | 1.86E-02 | 8.16E-02 | 7.45E-02 | 0.33 | 7.45E-02 | 0.33 | 5.88E-03 | 2.58E-02 | 0.98 | 4.29 | 0.82 | 3.61 | -- | -- | -- | -- | -- | -- | 1.85E-02 | 0.08 |
| | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | |
| **Totals** | **246.42** | **1076.85** | **245.88** | **1061.24** | **244.42** | **1054.80** | **4.28** | **18.67** | **38.28** | **107.96** | **46.97** | **163.68** | **405.73** | **1759.47** | **--** | **--** | **4.25** | **18.62** | **22.80** | **99.68** |

[1] **Condensables:** Include condensable particulate matter emissions in particulate matter calculations for PM-10 and PM-2.5, but not for TSP (PM).

[2] **TRS:** Total reduced sulfur (TRS) is the sum of the sulfur compounds hydrogen sulfide ($H_2S$), methyl mercaptan ($CH_4S$), dimethyl sulfide ($C_2H_6S$), and dimethyl disulfide ($C_2H_6S_2$).

[3] **Emissions for CO, $NO_X$, VOC, and PM from RTO1 are included in Dryer calculations.**

[4] **VOC emissions from RTO2 are included in Pellet Line calculations.**

# Section B.2: Proposed Allowable Emissions

Proposed Allowable Emissions (Potential to Emit) are those emissions the facility is currently permitted to emit as limited by a specific permit requirement or federal/state standard (e.g., a MACT standard); or the emission rate at which the facility proposes to emit considering emissions control devices, restrictions to operating rates/hours, or other requested permit limits that reduce the maximum emission rates. Emission Point numbering must be consistent throughout the application package and, for existing emission points, should match any MDEQ ID's in the current permit. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Additional columns may be added if there are regulated pollutants (other than HAPs and GHGs) emitted at the facility.

| Emission Point ID | TSP[1] | | PM10[1] | | PM2.5[1] | | $SO_2$ | | NOx | | CO | | VOC | | TRS | | Lead | | Total HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** | **lb/hr** | **ton/yr** |
| RD | 3.44 | 15.07 | 3.44 | 15.07 | 3.44 | 15.07 | 4.25 | 18.62 | 22.84 | 100.06 | 35.97 | 157.53 | 10.96 | 48.00 | -- | -- | 8.16E-03 | 3.57E-02 | 1.87 | 8.20 |
| HM1-HM4 | 4.29 | 18.77 | 4.29 | 18.77 | 4.29 | 18.77 | -- | -- | -- | -- | -- | -- | 30.88 | 135.2 | -- | -- | -- | -- | 0.80 | 3.52 |
| PL1 - PL9 | 4.29 | 18.77 | 4.29 | 18.77 | 4.29 | 18.77 | -- | -- | -- | -- | -- | -- | 7.43 | 32.54 | -- | -- | -- | -- | 1.00E-02 | 4.40E-02 |
| PSS1 | 1.26 | 5.50 | 0.32 | 1.39 | 5.53E-02 | 0.24 | -- | -- | -- | -- | -- | -- | 1.39 | 6.10 | -- | -- | -- | -- | 0.20 | 0.88 |
| TLS | 4.32 | 18.92 | 1.46 | 6.38 | 0.25 | 1.08 | -- | -- | -- | -- | -- | -- | 1.39 | 6.10 | -- | -- | -- | -- | 0.20 | 0.88 |
| ENG1 | 0.25 | 6.22E-02 | 1.67 | 0.42 | 1.67 | 0.42 | 8.24E-03 | 2.06E-03 | 7.96 | 1.99 | 4.36 | 1.09 | 1.87 | 0.47 | -- | -- | -- | -- | 2.05E-02 | 5.13E-03 |
| ENG2 | 0.15 | 3.69E-02 | 0.99 | 0.25 | 0.99 | 0.25 | 4.89E-03 | 1.22E-03 | 2.95 | 0.74 | 2.58 | 0.65 | 1.11 | 0.28 | -- | -- | -- | -- | 1.22E-02 | 3.04E-03 |
| ENG3 | 7.60E-02 | 1.90E-02 | 0.51 | 0.13 | 0.51 | 0.13 | 2.51E-03 | 6.28E-04 | 1.52 | 0.38 | 1.33 | 0.33 | 0.57 | 0.14 | -- | -- | -- | -- | 6.26E-03 | 1.57E-03 |
| ENG4 | 3.22E-02 | 8.06E-03 | 0.11 | 2.70E-02 | 0.11 | 2.70E-02 | 5.33E-04 | 1.33E-04 | 0.38 | 9.47E-02 | 0.40 | 0.10 | 0.12 | 3.03E-02 | -- | -- | -- | -- | 1.33E-03 | 3.32E-04 |
| ENG5 | 3.22E-02 | 8.06E-03 | 0.11 | 2.70E-02 | 0.12 | 3.03E-02 | 5.33E-04 | 1.33E-04 | 0.38 | 9.47E-02 | 0.40 | 0.10 | 0.12 | 3.03E-02 | -- | -- | -- | -- | 1.33E-03 | 3.32E-04 |
| FWP1 | 6.32E-02 | 1.58E-02 | 0.42 | 0.11 | 0.42 | 0.11 | 2.09E-03 | 5.22E-04 | 1.26 | 0.32 | 1.11 | 0.28 | 0.47 | 0.12 | -- | -- | -- | -- | 5.21E-03 | 1.30E-03 |
| RTO1 | -- | -- | -- | -- | -- | -- | 5.88E-03 | 2.58E-02 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9.26E-04 | 4.06E-03 |
| RTO2 | 1.86E-02 | 8.16E-02 | 7.45E-02 | 0.33 | 7.45E-02 | 0.33 | 5.88E-03 | 2.58E-02 | 0.98 | 4.29 | 0.82 | 3.61 | -- | -- | -- | -- | -- | -- | 9.26E-04 | 4.06E-03 |
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| **Totals** | **18.21** | **77.3** | **17.66** | **61.65** | **16.20** | **55.21** | **4.28** | **18.67** | **38.28** | **107.96** | **46.97** | **163.68** | **56.32** | **229.1** | **--** | **--** | **8.16E-03** | **3.57E-02** | **3.14** | **13.55** |

[1] **Condensables:** Include condensable particulate matter emissions in particulate matter calculations for PM-10 and PM-2.5, but not for TSP (PM).

[2] **TRS:** Total reduced sulfur (TRS) is the sum of the sulfur compounds hydrogen sulfide ($H_2S$), methyl mercaptan ($CH_4S$), dimethyl sulfide ($C_2H_6S$), and dimethyl disulfide ($C_2H_6S_2$).

[3] **Emissions for CO, $NO_X$, VOC, and PM from RTO1 are included in Dryer calculations.**

[4] **VOC emissions from RTO2 are included in Pellet Line calculations.**

## Section B.3: Proposed Allowable Hazardous Air Pollutants (HAPs)

In the table below, report the Proposed Allowable Emissions (Potential to Emit) for each HAP from each regulated emission unit if the HAP > 0.0001 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAPs shall be the sum of all HAP sources. Use the HAP nomenclature as it appears in the Instructions. Emission Point numbering must be consistent throughout the application package and, for existing emission points, should match any MDEQ ID's in the current permit. For each HAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected or the pollutant is emitted in a quantity less than the threshold amounts described above. Additional columns may be added as necessary to address each HAP.

| Emission Point ID | Total HAPs | | Acetaldehyde | | Benzene | | Formaldehyde | | Hexane | | Hydrogen Chloride | | Methanol | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr |
| RD | 1.87 | 8.20 | 0.28 | 1.21 | -- | -- | 0.35 | 1.54 | -- | -- | 0.97 | 4.24 | 0.97 | 1.21 |
| HM1-HM4 | 0.80 | 3.52 | 0.20 | 0.88 | -- | -- | 0.40 | 1.76 | -- | -- | -- | -- | 0.20 | 0.88 |
| PL1 - PL9 | 1.00E-02 | 4.40E-02 | 2.51E-03 | 1.10E-02 | -- | -- | 5.02E-03 | 2.20E-02 | -- | -- | -- | -- | 2.51E-03 | 1.10E-02 |
| PSS1 | 0.20 | 0.88 | 5.02E-02 | 0.22 | -- | -- | 0.10 | 0.44 | -- | -- | -- | -- | 5.02E-02 | 0.22 |
| TLS | 0.20 | 0.88 | 5.02E-02 | 0.22 | -- | -- | 0.10 | 0.44 | -- | -- | -- | -- | 5.02E-02 | 0.22 |
| ENG1 | 1.17E-03 | 5.13E-03 | 4.06E-03 | 1.02E-03 | 4.94E-03 | 1.24E-03 | 6.25E-03 | 1.56E-03 | -- | -- | -- | -- | -- | -- |
| ENG2 | 6.95E-04 | 3.04E-03 | 2.41E-03 | 6.03E-04 | 2.93E-03 | 7.33E-04 | 3.71E-03 | 9.27E-04 | -- | -- | -- | -- | -- | -- |
| ENG3 | 3.58E-04 | 1.57E-03 | 1.24E-03 | 3.10E-04 | 1.51E-03 | 3.77E-04 | 1.91E-03 | 4.77E-04 | -- | -- | -- | -- | -- | -- |
| ENG4 | -- | 3.32E-04 | 2.63E-04 | -- | 3.20E-04 | -- | 4.05E-04 | 1.01E-04 | -- | -- | -- | -- | -- | -- |
| ENG5 | -- | 3.32E-04 | 2.63E-04 | -- | 3.20E-04 | -- | 4.05E-04 | 1.01E-04 | -- | -- | -- | -- | -- | -- |
| FWP1 | 2.97E-04 | 1.30E-03 | 1.03E-03 | 2.58E-04 | 1.25E-03 | 3.13E-04 | 1.59E-03 | 3.96E-04 | -- | -- | -- | -- | -- | -- |
| RTO1 | 9.26E-04 | 4.06E-03 | -- | -- | -- | -- | 3.68E-04 | 1.61E-04 | 8.82E-04 | 3.86E-03 | -- | -- | -- | -- |
| RTO2 | 9.26E-04 | 4.06E-03 | -- | -- | -- | -- | 3.68E-04 | 1.61E-04 | 8.82E-04 | 3.86E-03 | -- | -- | -- | -- |
| F-DB | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| F-CH | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| F-STP1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| F-MT | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| FDCS | 0.20 | 0.88 | 5.02E-02 | 0.22 | -- | -- | 0.10 | 0.44 | -- | -- | -- | -- | 5.02E-02 | 0.22 |
| **Totals:** | 3.29 | 14.43 | 0.64 | 2.76 | 1.13E-02 | 2.83E-03 | 1.07 | 4.65 | 1.76E-03 | 7.73E-03 | 0.97 | 4.24 | 1.32 | 2.76 |

| Emission Point ID | Napthalene | | Toluene | | Acrolein | | Xylenes | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr |
| RD | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| HM1-HM4 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| PL1 - PL9 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| PSS1 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| BLS | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| ENG1 | 4.49E-04 | 1.12E-04 | 2.17E-03 | 5.42E-04 | 4.90E-04 | 1.23E-04 | 1.51E-03 | 3.78E-04 | | | | | | |
| ENG2 | 2.67E-04 | -- | 1.29E-03 | 3.21E-04 | 2.91E-04 | -- | 8.96E-04 | 2.24E-04 | | | | | | |
| ENG3 | 1.37E-04 | -- | 6.61E-04 | 1.65E-04 | 1.50E-04 | -- | 4.61E-04 | 1.15E-04 | | | | | | |
| ENG4 | -- | -- | 1.40E-04 | -- | -- | -- | -- | -- | | | | | | |
| ENG5 | -- | -- | 1.40E-04 | -- | -- | -- | -- | -- | | | | | | |
| FWP1 | 1.14E-04 | -- | 5.50E-04 | 1.37E-04 | 1.24E-04 | -- | 3.83E-04 | -- | | | | | | |
| RTO1 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| RTO2 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| F-DB | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| F-CH | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| F-STP1 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| F-MT | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| FDCS | -- | -- | -- | -- | -- | -- | -- | -- | | | | | | |
| **Totals:** | 1.03E-03 | 2.59E-04 | 4.95E-03 | 1.25E-03 | 1.12E-03 | 2.80E-04 | 3.45E-03 | 8.61E-04 | -- | -- | -- | -- | -- | -- |

## Section B.4: Greenhouse Gas Emissions

Applicants must report potential emission rates in SHORT TONS per year, as opposed to metric tons required by Part 98. Emission Point numbering must be consistent throughout the application package and, for existing emission points, should match any MDEQ ID's in the current permit.

| | | $CO_2$ (non-biogenic) ton/yr | $CO_2$ (biogenic)[2] ton/yr | $N_2O$ ton/yr | $CH_4$ ton/yr | $SF_6$ ton/yr | PFC/HFC[3] ton/yr | | | | | Total GHG Mass Basis ton/yr[5] | Total $CO_2$e ton/yr[6] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Emission Point ID** | **GWPs [1]** | **1** | **1** | **298** | **25** | **22,800** | **footnote 4** | | | | | | |
| **RD** | **mass GHG** | 145,197 | | 9.68 | 15.64 | | | | | | | 145,222 | 148,472 |
| | **$CO_2$e** | 145,197 | | 2,885 | 390.9 | | | | | | | | |
| **ENG1** | **mass GHG** | 216.0 | | 1.75E-03 | 8.76E-03 | | | | | | | 216.0 | 216.7 |
| | **$CO_2$e** | 216.0 | | 0.52 | 0.22 | | | | | | | | |
| **ENG2** | **mass GHG** | 128.1 | | 1.04E-03 | 5.20E-03 | | | | | | | 128.1 | 128.6 |
| | **$CO_2$e** | 128.1 | | 0.31 | 0.13 | | | | | | | | |
| **ENG3** | **mass GHG** | 65.91 | | 5.35E-04 | 2.67E-03 | | | | | | | 65.92 | 66.14 |
| | **$CO_2$e** | 65.91 | | 0.16 | 6.68E-02 | | | | | | | | |
| **ENG4** | **mass GHG** | 13.98 | | 1.13E-04 | 5.67E-04 | | | | | | | 13.98 | 14.03 |
| | **$CO_2$e** | 13.98 | | 3.38E-02 | 1.42E-02 | | | | | | | | |
| **ENG5** | **mass GHG** | 13.98 | | 1.13E-04 | 5.67E-04 | | | | | | | 13.98 | 14.03 |
| | **$CO_2$e** | 13.98 | | 3.38E-02 | 1.42E-02 | | | | | | | | |
| **FWP1** | **mass GHG** | 55.20 | | 4.44E-04 | 2.22E-03 | | | | | | | 55.20 | 55.39 |
| | **$CO_2$e** | 55.20 | | 0.13 | 5.56E-02 | | | | | | | | |
| **RTO1** | **mass GHG** | 5,153 | | 9.45E-02 | 9.88E-02 | | | | | | | 5,153 | 5,184 |
| | **$CO_2$e** | 5,153 | | 28.15 | 2.47 | | | | | | | | |
| **RTO2** | **mass GHG** | 5,153 | | 9.45E-02 | 9.88E-02 | | | | | | | 5,153 | 5,184 |
| | **$CO_2$e** | 5,153 | | 28.15 | 2.47 | | | | | | | | |
| **FACILITY TOTAL** | **mass GHG** | **155,996** | | **9.87** | **15.83** | | | | | | | **156,022** | **159,335** |
| | **$CO_2$e** | **155,996** | | **2,941** | **395.9** | | | | | | | | |

[1] **GWP** (Global Warming Potential): Applicants must use the most current GWPs codified in Table A-1 of 40 CFR part 98. GWPs are subject to change, therefore, applicants need to check 40 CFR 98 to confirm GWP values.

[2] Biogenic CO2 is defined as carbon dioxide emissions resulting from the combustion or decomposition of non-fossilized and biodegradable organic material originating from plants, animals, or micro-organisms.

[3] For **HFCs** or **PFCs** describe the specific HFC or PFC compound and use a separate column for each individual compound.

[4] For each new compound, enter the appropriate GWP for each HFC or PFC compound from Table A-1 in 40 CFR 98.

[5] Greenhouse gas emissions on a **mass basis** is the ton per year greenhouse gas emission before adjustment with its GWP. Do not include biogenic $CO_2$ in this total.

[6] **$CO_2$e** means Carbon Dioxide Equivalent and is calculated by multiplying the TPY mass emissions of the greenhouse gas by its GWP. Do not include biogenic $CO_2$e in this total.

## Section B.5: Stack Parameters and Exit Conditions [1]

Emission Point numbering must be consistent throughout the application package and, for existing emission points, should match any MDEQ ID's in the current permit.

| Emission Point ID | Orientation (H-Horizontal V=Vertical) | Rain Caps (Yes or No) | Height Above Ground (ft) | Base Elevation (ft) | Exit Temp. (°F) | Inside Diameter or Dimensions (ft) | Velocity (ft/sec) | Moisture by Volume (%) | Geographic Position (degrees/minutes/seconds) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Latitude | Longitude |
| [1] The facility will submit the stack parameters to MDEQ after the completion of the final design of the facility. | | | | | | | | | | |
| RD | TBD | TBD | TBD | TBD | 250.0 | TBD | TBD | TBD | TBD | TBD |
| HM1 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| HM2 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| HM3 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| HM4 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL1 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL2 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL3 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL4 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL5 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL6 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL7 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL8 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PL9 | TBD | TBD | TBD | TBD | 150.0 | TBD | TBD | TBD | TBD | TBD |
| PSS1 | TBD | TBD | TBD | TBD | Ambient | TBD | TBD | TBD | TBD | TBD |
| TLS | TBD | TBD | TBD | TBD | Ambient | TBD | TBD | TBD | TBD | TBD |
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[1] A WAAS-capable GPS receiver should be used and in the WGS84 or NAD83 coordinate system.

| FORM 5 | MDEQ | MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY APPLICATION FOR AIR POLLUTION CONTROL PERMIT |
|---|---|---|

**Fuel Burning Equipment - External Combustion Sources** | **Section C**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): RD

B. Equipment Description: Rotary dryer

C. Manufacturer: TBD

D. Model Yr and No.: TBD

E. Maximum Heat Input: (higher heating value): 170.00 MMBtu/hr

F. Nominal Heat Input Capacity 170.00 MMBtu/hr

G. For units subject to NSPS Db, is the heat release rate > 70,000 Btu/hr-ft$^3$? ☐ Yes ☐ No

H. Use: ☐ Electrical Generation ☐ Steam ☒ Process Heat ☐ Space Heat ☐ Standby/Emergency ☐ Other (describe): ______

I. Heat Mechanism: ☒ Direct ☐ Indirect

J. Burner Type (e.g., pulverized coal, forced draft, atomizing oil, low-$NO_x$, etc.): step grate furnace burner

K. Additional Design Controls (e.g., FGR, etc.): ______

L. Status: ☐ Operating ☒ Proposed ☐ Under Construction

M. Date of construction, or most recent modification (for existing sources) or date of anticipated construction: 2019

**2. Fuel Type**

Complete the following table, identifying each type of fuel and the amount used. Specify the units for heat content, hourly usage, and yearly usage

| FUEL TYPE[1] | HEAT CONTENT | % SULFUR | % ASH | MAXIMUM HOURLY USAGE | MAXIMUM YEARLY USAGE |
|---|---|---|---|---|---|
| Biomass | 4,500 - 8,000 BTU/lb | N/A | N/A | 18.89 tons | 165,467 tons |
| | | | | | |
| | | | | | |

Please list any fuel components that are hazardous air pollutants and the percentage in the fuel:

1. Boilers burning solid waste may considered " solid waste incinerators" for purposes of complying with federal regulations. However, you are only required to complete Section C, not I, of this application as long as the wastes combusted are indicated in the table above.

| FORM 5 | MDEQ | MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY APPLICATION FOR AIR POLLUTION CONTROL PERMIT |
|---|---|---|

**Fuel Burning Equipment - Internal Combustion Sources** **Section D**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): ENG1

B. Equipment Description: diesel-fired emergency generator engine

C. Manufacturer: TBD

D. Model Yr and No.: 2019 and TBD

E. Maximum Heat Input (higher heating value): 5.30 MMBtu/hr

F. Rated Power: 757 hp 564 kW

G. Use: [ ] Non-Emergency [X] Emergency

H. Displacement per cylinder: ________ Liters

I. Engine Ignition Type: [ ] Spark Ignition [X] Compression Ignition

J. Engine Burn Type: [ ] 4-stroke [ ] 2-stroke [ ] Rich Burn [X] Lean Burn
*(check all that apply)*

K. Design Controls (e.g., catalytic converter, diesel particulate, etc.): No Controls

L. Status: [ ] Operating [X] Proposed [ ] Under Construction

M. Engine Manufactured Date: 2019

N. Engine Order Date: 2019

N. Date of construction, or most recent modification (for existing sources) or date of anticipated construction: 2019

**2. Fuel Type**

| FUEL TYPE | HEAT CONTENT | % SULFUR | % ASH | MAXIMUM HOURLY USAGE | MAXIMUM YEARLY USAGE |
|---|---|---|---|---|---|
| Diesel Fuel | 140 MMBtu/Mgal | 0.0015 | N/A | 0.04 Mgal/hr | 18.93 Mgal/yr |
| | | | | | |
| | | | | | |
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| | | | | | |

| FORM 5 | MDEQ | MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY APPLICATION FOR AIR POLLUTION CONTROL PERMIT |
|---|---|---|

**Fuel Burning Equipment - Internal Combustion Sources** **Section D**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): ENG2

B. Equipment Description: diesel-fired emergency generator engine

C. Manufacturer: TBD

D. Model Yr and No.: 2019 and TBD

E. Maximum Heat Input (higher heating value): 3.14 MMBtu/hr

F. Rated Power: 449 hp 335 kW

G. Use: [ ] Non-Emergency [X] Emergency

H. Displacement per cylinder: ______ Liters

I. Engine Ignition Type: [ ] Spark Ignition [X] Compression Ignition

J. Engine Burn Type: [ ] 4-stroke [ ] 2-stroke [ ] Rich Burn [X] Lean Burn
*(check all that apply)*

K. Design Controls (e.g., catalytic converter, diesel particulate, etc.): No Controls

L. Status: [ ] Operating [X] Proposed [ ] Under Construction

M. Engine Manufactured Date: 2019

N. Engine Order Date: 2019

N. Date of construction, or most recent modification (for existing sources) or date of anticipated construction: 2019

**2. Fuel Type**

| FUEL TYPE | HEAT CONTENT | % SULFUR | % ASH | MAXIMUM HOURLY USAGE | MAXIMUM YEARLY USAGE |
|---|---|---|---|---|---|
| Diesel Fuel | 140 MMBtu/Mgal | 0.0015 | N/A | 0.02 Mgal/hr | 11.23 Mgal/yr |
| | | | | | |
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**Fuel Burning Equipment - Internal Combustion Sources** **Section D**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): ENG3

B. Equipment Description: diesel-fired emergency generator engine

C. Manufacturer: TBD

D. Model Yr and No.: 2019 and TBD

E. Maximum Heat Input (higher heating value): 1.62 MMBtu/hr

F. Rated Power: 231 hp 172 kW

G. Use: [ ] Non-Emergency [X] Emergency

H. Displacement per cylinder: ______ Liters

I. Engine Ignition Type: [ ] Spark Ignition [X] Compression Ignition

J. Engine Burn Type: [ ] 4-stroke [ ] 2-stroke [ ] Rich Burn [X] Lean Burn
*(check all that apply)*

K. Design Controls (e.g., catalytic converter, diesel particulate, etc.): No Controls

L. Status: [ ] Operating [X] Proposed [ ] Under Construction

M. Engine Manufactured Date: 2019

N. Engine Order Date: 2019

N. Date of construction, or most recent modification (for existing sources) or date of anticipated construction: 2019

**2. Fuel Type**

| FUEL TYPE | HEAT CONTENT | % SULFUR | % ASH | MAXIMUM HOURLY USAGE | MAXIMUM YEARLY USAGE |
|---|---|---|---|---|---|
| Diesel Fuel | 140 MMBtu/Mgal | 0.0015 | N/A | 0.01 Mgal/hr | 5.78 Mgal/yr |
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|---|---|---|

**Fuel Burning Equipment - Internal Combustion Sources** **Section D**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): ENG4

B. Equipment Description: diesel-fired emergency generator engine

C. Manufacturer: TBD    D. Model Yr and No.: 2019 and TBD

E. Maximum Heat Input (higher heating value): 0.34 MMBtu/hr

F. Rated Power: 49 hp 37 kW

G. Use: [ ] Non-Emergency [X] Emergency

H. Displacement per cylinder: ______ Liters

I. Engine Ignition Type: [ ] Spark Ignition [X] Compression Ignition

J. Engine Burn Type: [ ] 4-stroke [ ] 2-stroke [ ] Rich Burn [X] Lean Burn
*(check all that apply)*

K. Design Controls (e.g., catalytic converter, diesel particulate, etc.): No Controls

L. Status: [ ] Operating [X] Proposed [ ] Under Construction

M. Engine Manufactured Date: 2019    N. Engine Order Date: 2019

N. Date of construction, or most recent modification (for existing sources) or date of anticipated construction: 2019

**2. Fuel Type**

| FUEL TYPE | HEAT CONTENT | % SULFUR | % ASH | MAXIMUM HOURLY USAGE | MAXIMUM YEARLY USAGE |
|---|---|---|---|---|---|
| Diesel Fuel | 140 MMBtu/Mgal | 0.0015 | N/A | 0.002 Mgal/hr | 1.23 Mgal/yr |
| | | | | | |
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|---|---|---|

**Fuel Burning Equipment - Internal Combustion Sources** — **Section D**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): ENG5

B. Equipment Description: diesel-fired emergency generator engine

C. Manufacturer: TBD

D. Model Yr and No.: 2019 and TBD

E. Maximum Heat Input (higher heating value): 0.34 MMBtu/hr

F. Rated Power: 49 hp 37 kW

G. Use: [ ] Non-Emergency [X] Emergency

H. Displacement per cylinder: ______ Liters

I. Engine Ignition Type: [ ] Spark Ignition [X] Compression Ignition

J. Engine Burn Type: [ ] 4-stroke [ ] 2-stroke [ ] Rich Burn [X] Lean Burn
*(check all that apply)*

K. Design Controls (e.g., catalytic converter, diesel particulate, etc.): No Controls

L. Status: [ ] Operating [X] Proposed [ ] Under Construction

M. Engine Manufactured Date: 2019

N. Engine Order Date: 2019

N. Date of construction, or most recent modification (for existing sources) or date of anticipated construction: 2019

**2. Fuel Type**

| FUEL TYPE | HEAT CONTENT | % SULFUR | % ASH | MAXIMUM HOURLY USAGE | MAXIMUM YEARLY USAGE |
|---|---|---|---|---|---|
| Diesel Fuel | 140 MMBtu/Mgal | 0.0015 | N/A | 0.002 Mgal/hr | 1.23 Mgal/yr |
| | | | | | |
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**Fuel Burning Equipment - Internal Combustion Sources** — **Section D**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): FWP1

B. Equipment Description: diesel fired emergency fire pump engine

C. Manufacturer: TBD

D. Model Yr and No.: 2019 and TBD

E. Maximum Heat Input (higher heating value): 1.34 MMBtu/hr

F. Rated Power: 192 hp 143 kW

G. Use: [ ] Non-Emergency [X] Emergency

H. Displacement per cylinder: ______ Liters

I. Engine Ignition Type: [ ] Spark Ignition [X] Compression Ignition

J. Engine Burn Type: [ ] 4-stroke [ ] 2-stroke [ ] Rich Burn [X] Lean Burn
*(check all that apply)*

K. Design Controls (e.g., catalytic converter, diesel particulate, etc.): No Controls

L. Status: [ ] Operating [X] Proposed [ ] Under Construction

M. Engine Manufactured Date: 2019

N. Engine Order Date: 2019

N. Date of construction, or most recent modification (for existing sources) or date of anticipated construction: 2019

**2. Fuel Type**

| FUEL TYPE | HEAT CONTENT | % SULFUR | % ASH | MAXIMUM HOURLY USAGE | MAXIMUM YEARLY USAGE |
|---|---|---|---|---|---|
| Diesel Fuel | 140 MMBtu/Mgal | 0.0015 | N/A | 0.01 Mgal/hr | 4.80 Mgal/yr |
| | | | | | |
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**Manufacturing Processes** | **Section E**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): F-DB and F-CH (debarking and chipping operations)

B. Process Description: Log preparation includes debarking and chipping. The resulting bark and wood chips will be moved to the green raw material storage pile to be processed with the received raw material.

C. Manufacturer: N/A D. Model: N/A

E. Max. Design Capacity (specify units): 1,100,000 tpy
Equivalent to: 125.57 tons/hr

F. Status: ☐ Operating ☒ Proposed ☐ Under Construction

G. Operating Schedule (Actual): 24 hrs/day 7 days/week 52 weeks/yr

H. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction.
2019

**2. Raw Material Input**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Logs | 251,142 lb/hr | 251,142 lb/hr | 1,100,000 tpy |
| | | | |
| | | | |
| | | | |
| | | | |

**3. Product Output**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Wood Chips | 188,356 lb/hr | 188,356 lb/hr | 825,000 tpy |
| Bark | 62,785 lb/hr | 62,785 lb/hr | 275,000 tpy |
| | | | |
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**Manufacturing Processes** — **Section E**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): F-STP1 and F-MT (storage pile and material transfer)

B. Process Description: Raw material, mostly green sawdust, shavings, bark and wood chips, will be received via truck at the Newton facility and will be stored in a chip pile before being processed.

C. Manufacturer: N/A

D. Model: N/A

E. Max. Design Capacity (specify units): 880,000 tpy
Equivalent to: 100.46 tons/hr

F. Status: [ ] Operating [X] Proposed [ ] Under Construction

G. Operating Schedule (Actual): 24 hrs/day 7 days/week 52 weeks/yr

H. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction.
2019

**2. Raw Material Input**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Wood | 200,913 lb/hr | 200,913 lb/hr | 880,000 tpy |
| | | | |
| | | | |
| | | | |
| | | | |

**3. Product Output**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Wood | 200,913 lb/hr | 200,913 lb/hr | 880,000 tpy |
| | | | |
| | | | |
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**Manufacturing Processes** **Section E**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): RD (Biomass Rotary Dryer)

B. Process Description: Green chips, sawdust, and other types of wood go into the direct-fired rotary dryer. Material is dried from ~50% moisture to ~5% moisture.

C. Manufacturer: TBD D. Model: TBD

E. Max. Design Capacity (specify units): 440,000 tpy
Equivalent to: 50.23 tons/hr

F. Status: ☐ Operating ☒ Proposed ☐ Under Construction

G. Operating Schedule (Actual): 24 hrs/day 7 days/week 52 weeks/yr

H. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction.
2019

**2. Raw Material Input**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Wet Wood | 200,913 lb/hr | 200,913 lb/hr | 880,000 tpy |
| | | | |
| | | | |
| | | | |
| | | | |

**3. Product Output**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Dry Wood | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| | | | |
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**Manufacturing Processes** — **Section E**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): HM1-HM4 (Dry Hammermill No. 1-4)

B. Process Description: Dry wood from the rotary dryer is sent to the 4 dry hammermills for sizing.

C. Manufacturer: TBD    D. Model: TBD

E. Max. Design Capacity (specify units): 30,000 lb/hr
Equivalent to: 15.00 tons/hr

F. Status: [ ] Operating [X] Proposed [ ] Under Construction

G. Operating Schedule (Actual): 24 hrs/day 7 days/week 52 weeks/yr

H. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction.
2019

**2. Raw Material Input**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Dry Wood | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| | | | |
| | | | |
| | | | |
| | | | |

**3. Product Output**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Sized Wood | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| | | | |
| | | | |
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**Manufacturing Processes** — **Section E**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): PL1-9 (Pellet Line No. 1-9)

B. Process Description: Sized dry wood will go to the pelleting line. Formed pellets will be created in the pellet mills and cooled in the pellet coolers. All exhaust is controlled by a baghouse and RTO2.

C. Manufacturer: TBD D. Model: TBD

E. Max. Design Capacity (specify units): 12,125 lb/hr
Equivalent to: 6.06 tons/hr

F. Status: ☐ Operating ☒ Proposed ☐ Under Construction

G. Operating Schedule (Actual): 24 hrs/day 7 days/week 52 weeks/yr

H. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction.
2019

**2. Raw Material Input**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Sized Wood | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| | | | |
| | | | |
| | | | |
| | | | |

**3. Product Output**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Wood Pellets | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| | | | |
| | | | |
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|---|---|---|

**Manufacturing Processes** | **Section E**

**1. Emission Point Description**

A. Emission Point Designation (Ref. No.): FDCS, PSS1, and TLS (Fugitive Dry Chip Storage, Pellet Storage Silo, and Truck Loadout System)

B. Process Description: Material handling and storage process. Dried wood chips from the dryer are stored in a dried fibre storage tent. Cooled pellets are stored in an atmospheric weather-tight storage silo. Pellets are loaded into trucks for final shipments.

C. Manufacturer: N/A  D. Model: N/A

E. Max. Design Capacity (specify units): 440,000 tpy
Equivalent to: 50.23 tons/hr

F. Status: [ ] Operating [X] Proposed [ ] Under Construction

G. Operating Schedule (Actual): 24 hrs/day 7 days/week 52 weeks/yr

H. Date of construction, reconstruction, or most recent modification (for existing sources) or date of anticipated construction.
2019

**2. Raw Material Input**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Wood Pellets | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| Dried Wood Chips | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| | | | |
| | | | |
| | | | |

**3. Product Output**

| MATERIAL | QUANTITY/HR AVERAGE | QUANTITY/HR MAXIMUM | QUANTITY/YEAR MAXIMUM |
|---|---|---|---|
| Wood Pellets | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| Dried Wood Chips | 100,457 lb/hr | 100,457 lb/hr | 440,000 tpy |
| | | | |
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**Baghouses/Fabric Filters** **Section L1**

**1. Oxidation System Equipment**

A. Emission Point Designation (Ref. No.): HM1-4

B. Equipment Description (include the process(es) that adsorption controls emissions from):

Baghouse to be installed for the four (4) dry hammermills

C. Manufacturer: TBD D. Model: TBD

E. Status: ☐ Operating ☒ Proposed ☐ Under Construction

**2. Baghouse Data**

A. Cloth Area :________________ $ft^2$ B. Air to cloth ratio:__________________ $ft^2$

C. Type of bag: ☐ Woven ☐ Felted ☐ Membrane ☐ Other

D. Filter Material _________________________ E. Max. Filter Operating Temp. __________ $^oF$

F. No. of compartment ____________ G. No. of bags per compartment: ____________

H. Bag Length _____________ ft I. Bag diameter _______________ ft

J. Pressure drop: TBD in $H_20$ K. Inlet air flow rate: 57,801 ACFM

L. Air temperature 150 $^oF$ M. Efficiency (PM): 95%

N. Is a pressure measurement device installed ☒ Yes ☐ No Warning alarm? ☒ Yes ☐ No

O. Dirty air is on ..: ☐ Inside of bag ☐ Outside of bag

P. Time between bag cleaning (specify units): ________ ☐ Automatic ☐ Timed ☐ Manual

Q. Method of cleaning ☐ Shaking ☐ Reverse air ☐ Pulse Jet ☐ Other:____________________

R. Are extra bags readily available? ☒ Yes ☐ No If yes, how many? TBD

S. Method of determining when to replace bags: ☐ Alarm ☒ Internal Inspection ☐ Visible Emissions ☐ Other: ____________________

T. How is the collected dust stored, handled, and disposed of?

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|---|---|---|

**Baghouses/Fabric Filters** — **Section L1**

**1. Oxidation System Equipment**

A. Emission Point Designation (Ref. No.): PL1-9

B. Equipment Description (include the process(es) that adsorption controls emissions from):

Baghouse to be installed for the nine (9) pellet lines

C. Manufacturer: TBD D. Model: TBD

E. Status: [ ] Operating [X] Proposed [ ] Under Construction

**2. Baghouse Data**

A. Cloth Area :________________ $ft^2$ B. Air to cloth ratio:__________________$ft^2$

C. Type of bag: [ ] Woven [ ] Felted [ ] Membrane [ ] Other

D. Filter Material ________________________ E. Max. Filter Operating Temp. : _________ $^oF$

F. No. of compartments ___________ G. No. of bags per compartment: ___________

H. Bag Length ____________ ft I. Bag diameter ______________ ft

J. Pressure drop: TBD in $H_20$ K. Inlet air flow rate: __ 57,801 ACFM

L. Air temperature ____ 150 $^oF$ M. Efficiency (PM): __ 95%

N. Is a pressure measurement device installed [X] Yes [ ] No Warning alarm? [X] Yes [ ] No

O. Dirty air is on ..: [ ] Inside of bag [ ] Outside of bag

P. Time between bag cleaning (specify units): ________ [ ] Automatic [ ] Timed [ ] Manual

Q. Method of cleaning [ ] Shaking [ ] Reverse air [ ] Pulse Jet [ ] Other:___________________

R. Are extra bags readily available? [X] Yes [ ] No If yes, how many? _ TBD

S. Method of determining when to replace bags: [ ] Alarm [X] Internal Inspection [ ] Visible Emissions [ ] Other: ____________________

T. How is the collected dust stored, handled, and disposed of?

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|---|---|---|

**Oxidation Systems** — **Section L4**

## 1. Oxidation System Equipment

A. Emission Point Designation (Ref. No.): RTO1

B. Equipment Description (include the process(es) that adsorption controls emissions from):

Regenerative thermal oxidizer to be installed for the rotary dryer.

C. Manufacturer: TBD    D. Model: TBD

E. Status: ☐ Operating  ☒ Proposed  ☐ Under Construction

## 2. Oxidation System Data

A. Type of Oxidation Process:

- ☐ Afterburner
- ☐ Flare
- ☐ Recuperative Thermal Oxidizer
- ☐ Recuperative Catalytic Oxidizer
- ☒ Regenerative Thermal Oxidizer
- ☐ Regenerative Catalytic Oxidizer
- ☐ Other: ______

B. Efficiency: 95 % (estimated) Controlling the following pollutant(s): VOC
Efficiency: 95 % (estimated) Controlling the following pollutant(s): HAP

C. Inlet air flow rate: TBD acfm

D. Combustion Chamber Temperature: Minimum: 1500 °F Maximum: 1500 °F

E. Maximum burner rating: 10 MMBtu/hr    F. Fuel Type: Natural gas

G. Fuel Usage Rate (specify units): ______    H. Sulfur in Fuel: -- wt %

I. Residence Time: ______ seconds    J. Percent Excess Air: ______ %

K. Combustion Chamber Volume: ______ ft3

L. VOC Concentration: Inlet: ______ ppmv    Outlet: ______ ppmv

**2. Oxidation System Data (continued)**

M. Catalyst Data (if applicable):

1. Catalyst type: ______________________

2. Catalyst volume: ____________ ft3

3. How is spent catalyst disposed of? ______________________________________

N. Flare Data (if applicable):

1. Flare Type: ☐ Non-assisted ☐ Steam-assisted ☐ Air-assisted
   ☐ Other: ____________________________________

2. Net heating value of combusted gas: ____________ Btu/scf

3. Design exit velocity: ____________ ft/sec

4. Is the presence of a flare pilot flame monitored? ☐ Yes ☐ No

   If yes, please describe the monitoring: ______________________________________

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|---|---|---|

**Oxidation Systems** | **Section L4**

**1. Oxidation System Equipment**

A. Emission Point Designation (Ref. No.): RTO2

B. Equipment Description (include the process(es) that adsorption controls emissions from):

Regenerative thermal oxidizer to be installed for the nine (9) pellet coolers.

C. Manufacturer: TBD D. Model: TBD

E. Status: [ ] Operating [X] Proposed [ ] Under Construction

**2. Oxidation System Data**

A. Type of Oxidation Process:

[ ] Afterburner [ ] Flare

[ ] Recuperative Thermal Oxidizer [ ] Recuperative Catalytic Oxidizer

[X] Regenerative Thermal Oxidizer [ ] Regenerative Catalytic Oxidizer

[ ] Other: ____________

B. Efficiency: 95 % (estimated) Controlling the following pollutant(s): VOC
Efficiency: 95 % (estimated) Controlling the following pollutant(s): HAP

C. Inlet air flow rate: 57801.0 acfm

D. Combustion Chamber Temperature: Minimum: 1500 °F Maximum: 1500 °F

E. Maximum burner rating: 10 MMBtu/hr F. Fuel Type: Natural gas

G. Fuel Usage Rate (specify units): ____________ H. Sulfur in Fuel: -- wt %

I. Residence Time: ____________ seconds J. Percent Excess Air: ____________ %

K. Combustion Chamber Volume: ____________ ft3

L. VOC Concentration: Inlet: ____________ ppmv Outlet: ____________ ppmv

## 2. Oxidation System Data (continued)

M. Catalyst Data (if applicable):

1. Catalyst type: ______________________

2. Catalyst volume: __________ ft3

3. How is spent catalyst disposed of? ______________________________________

N. Flare Data (if applicable):

1. Flare Type: ☐ Non-assisted ☐ Steam-assisted ☐ Air-assisted
   ☐ Other: ____________________________________

2. Net heating value of combusted gas: __________ Btu/scf

3. Design exit velocity: __________ ft/sec

4. Is the presence of a flare pilot flame monitored? ☐ Yes ☐ No

   If yes, please describe the monitoring: ______________________________________

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# Electrostatic Precipitators (ESP) — Section L6

## 1 Electrostatic Precipitator Description

A. Emission Point Designation (Ref. No.): RD

B. Equipment Description (include the process(es) that ESP controls emissions from):
To be installed for the rotary dryer.

C. Manufacturer: TBD

D. Model: TBD

E. Status: ☐ Operating ☒ Proposed ☐ Under Construction

## 2 Electrostatic Precipitator Data

A. Precipitator Type: Wet Dry Single-stage Two-stage Other: ______

B. Efficienc 95 % Controlling the following pollutant(s): PM, $PM_{10}$, & $PM_{2.5}$
Efficienc 70 % Controlling the following pollutant(s): HCl

C. Inlet air flow rate: 148,000 acfm

D. Pressure Drop: N/A in. of $H_2O$

E. Inlet Temperature: 250 $^oF$

F. Total collection plate area: ______ $ft^2$

G. Collector Plate Size: Length: ______ ft Width: ______ ft

H. Gas Viscosity: ______ poise

I. Pollutant Resistivity: ______ ohm-cm

J. Field Charging: ______ volts Collecting: ______ volts

K. No. of fields: ______

L. No. of collector plates per field: ______

## 2 Electrostatic Precipitator Data (continued)

M. Spacing between collector plates: ______________ in.

N. No. of compartments: ______________

O. No. of discharge electrodes:

P. Corona Power: ______________ watts/1000cfm

Q. Electrical Usage: ______________ kW/hr

R. Cleaning Method: Plate Rapping Plate Vibrating Washing

Other: ______________________________________________

S. Rapper Frequency: ______________ min/cycle ☐ Automatic ☐

T. Is flue gas condition required? ☐ Yes ☐ No

U. Fan location relative to precipitator: ☐ Upstream ☐ Downstream

V. How is the collected dust stored, handled, and

W. List the electrical conditions per field:

| FIELD NO. | VOLTAGE | AMPERAGE (mA) |
|---|---|---|
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**Applicable Requirements and Status** — **Section N**

**1. Summary of Applicable Requirements**

Provide a list of all applicable federal standards for which your facility is or will be subject to, as well as a list of all Construction Permits establishing limits or restrictions issued to your facility. The specific emission standards and limitations applicable to each emission point shall be provided on the following pages (Parts 2 and 3).

**Federal Regulations:**

| 40 CFR Part | Subpart |
|---|---|
| 60 | IIII |
| 63 | ZZZZ |

**State Construction Permits[1]:**

Permit to Construct issued:

| MM/DD/YY[2] | PSD | PSD Avoidance[3] | Other |
|---|---|---|---|
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |

[1] Any Construction Permit containing requirements that are currently appplicable to the facility should be addressed in this section.

[2] If the permit has been modified, give the most recent modification date.

[3] Because permits are issued on a pollutant-by-pollutant basis, a PSD permit may be significant for one pollutant while also containing PSD avoidance limits for another pollutant. Therefore, you may check multiple boxes for each permit.

| FORM 5 | MDEQ | MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY APPLICATION FOR AIR POLLUTION CONTROL PERMIT |
|---|---|---|

**Applicable Requirements and Status** **Section N**

**3. Future Applicable Requirements**

List all future applicable state and federal requirements, including emission limits, operating restrictions, etc., and the applicable test methods or monitoring used to demonstrate compliance with each applicable requirement. Clearly identify federal regulations from state requirements.

| EMISSION POINT NO. | FUTURE APPLICABLE REQUIREMENT (Regulatory citation) | POLLUTANT | LIMITS/REQUIREMENTS | TEST METHOD/COMPLIANCE MONITORING | COMPLIANCE DATE[1] |
|---|---|---|---|---|---|
| **40 CFR 60 SUBPART IIII** | | | | | |
| ENG1, ENG2, ENG3, ENG4, ENG5 and FWP1 | 40 CFR 60.4211(a) | N/A | Operate and maintain the engine according to the manufacturer's emission-related written instructions. | N/A | |
| | 40 CFR 60.4211(c) | N/A | Maintain a copy of the US EPA certificate for the engine. | N/A | |
| | 40 CFR 60.4211(f)(3) | N/A | Non-emergency operation limitted to 50 hr/yr. | N/A | |
| | 40 CFR 60.4211(f)(2) | N/A | Testing and maintenance checks limitted to 100 hr/yr. | N/A | |
| | 40 CFR 60.4207(a) | $SO_2$ | 1.09E-05 lb/hp-hr (Sulfur content limitted to 15 ppmv) | N/A | |
| **40 CFR 63 Subpart ZZZZ** | | | | | |
| ENG1, ENG2, ENG3, ENG4, ENG5 and FWP1 | 40 CFR 63.6590 | N/A | Change oil and filter 1,000 hours or annually. | N/A | |
| ENG1, ENG2, ENG3, ENG4, ENG5 and FWP1 | 40 CFR 63.6590 | N/A | Inspect air cleaner 1,000 hours or annually. | N/A | |
| ENG1, ENG2, ENG3, ENG4, ENG5 and FWP1 | 40 CFR 63.6590 | N/A | Inspect all hoses and belts 500 hours or annually. | N/A | |

| State Requirements | | | | | |
|---|---|---|---|---|---|
| All Point Sources (RD, RTO1, HM1-4, PL1-9, RCO1, PSS1, TLS, ENG1-5, and FWP1) | Mississippi Admin Code Part 2, Chapter 1- Rule 1.3.A.1 | Smoke | Except for during startup and soot blowing operations, the permittee shall not cause, permit, or allow the emission of smoke from a point source into the open air from any manufacturing, industrial, commercial or waste disposal process which exceeds forty (40) percent opacity. | N/A | |
| All Point Sources (RD, RTO1, HM1-4, PL1-9, RCO1, PSS1, TLS, ENG1-5, and FWP1) | Mississippi Admin Code Part 2, Chapter 1- Rule 1.3.A.2 | Smoke | Startup opacity levels greater than 40% are limited to no more than 15 minutes per startup in one hour and no more than three startups in any 24 hour period. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.3.B | Equivalent Opacity | Maintain Opacity ≤ 40% | EPA Method 9/ Method 22 | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.3.C | N/A | The facility will comply with this regulation. | N/A | |
| RD, HM1-4, PL1-9, PSS1, and TLS | Mississippi Admin Code Part 2, Chapter 1- Rule 1.3.F | PM | The subject emission sources are less than the PWR allowable limits. Operation of baghouses, WESP, and good operation will ensure that compliance is maintained with the PWR. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.3.G | N/A | The facility will comply with this regulation. | N/A | |
| RD | Mississippi Admin Code Part 2, Chapter 1- Rule 1.4.A.1 | $SO_2$ | $SO_2$ Discharge ≤ 4.8 lb/MMBtu | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.4.B.1 | $SO_2$ | No emissions of $SO_2$ in excess of 500 ppmv from process equipment constructed after January 25, 1972. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.4.B. | $SO_2$ | No emissions of hydrogen sulfide in excess of one grain per 100 standard cubic feet from any gas stream. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.5.B | Miscellaneous Chemical Emissions | The facility will comply with this regulation. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.6 | N/A | The facility will comply with this regulation. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.8 | N/A | The facility will comply with this regulation. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 1- Rule 1.10 | N/A | The facility will submit notifications as required. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 4 | N/A | The facility will comply with this regulation. | N/A | |
| Facility Wide | Mississippi Admin Code Part 2, Chapter 6 | N/A | A title V operating permit application will be submitted in accordance with the due date identified in the air construction permit. | N/A | |

# APPENDIX D: VOC EMISSION FACTOR DOCUMENTATION

This appendix includes additional documentation pertaining to the VOC emissions factors utilized for the estimated potential emissions of the Newton facility. Specifically, this appendix includes the following documents:

- Performance testing on the dryer system at Pinnacle's Aliceville Pellet Mill in July 2015
  - As discussed in Section 3 of the narrative, the dryer at Pinnacle's Aliceville facility is very similar to the proposed dryer at Newton. The system includes as a WESP and RTO, and is similar in size and capacity.
  - The results from the testing represent controlled emission rates in units of "lb/hr"
  - The throughput during testing was 37.1 tons/hr, as listed in Page 6 of the report. Therefore, the emission factors utilized in the emissions inventory are the "lb/hr" numbers divided by 37.1 ton/hr, which provide factors in units of "lb/ton".
- Performance testing on the pellet coolers and dry hammermills baghouse at Pinnacle's Aliceville Pellet Mill in October 2018
  - This report contains emissions obtained on two (2) stacks at Aliceville, RTO2 (which is the RTO/RCO controlling VOC emissions on the pellet cooler lines) and BH1 (the baghouse controlling PM emissions on the dry hammermills at Aliceville).
  - The proposed dry hammermills and pellet coolers at Newton will be similar in controls and in capacity to the units at Aliceville.
  - The factors utilized in the potential emissions inventory for these units do not come from this test report. The factors are from engineering test runs conducted independently at the Aliceville facility as noted in the footnotes in Appendix B. Pinnacle chose to conservatively utilize more conservative emissions factors from engineering testing, which represents the worst-case VOC emissions measured on these units. Additionally, as these factors are from engineering testing, there is no test report that was submitted to the Alabama agency (ADEM). The emissions, as shown in the included October 2018 test report, are substantially lower than what is represented in Appendix B. Pinnacle submits this report as evidence that the proposed units at Newton will be able to meet the VOC emission limits.
- The GA Environmental Protection Division (EPD) recommended emission factors for pellet mills
  - These factors have been vetted and approved by EPA Region IV.
- The TNRCC document for estimating VOC from various fugitive processes
  - This has been accepted by other state agencies

*TOTAL PM, CO, NOx, VOC AND VISIBLE EMISSIONS TEST*

# *NO. 1 WET ELECTROSTATIC PRECIPITATOR AND REGENERATIVE THERMAL OXIDIZER (RD)*

# *WESTERVELT PELLETS I, LLC*

## *ALICEVILLE, ALABAMA PELLET PLANT*

*PERMIT NO. 409-0010*

*Aliceville, Alabama*
*July 30, 2015*

Westervelt Pellets I, LLC
6777 Highway 17
Aliceville, Alabama 35442

*Performed by:*

ENVIRONMENTAL MONITORING LABORATORIES, INC.

624 Ridgewood Road
P.O. Box 655
Ridgeland, Mississippi 39158

Phone: (601)856-3092
Fax: (601)853-2151

REPORT OF
AIR EMISSIONS TEST
FOR
WESTERVELT PELLETS I, LLC
NO. 1 WET ELECTROSTATIC PRECIPITATOR
AND REGENERATIVE THERMAL OXIDIZER (RD)
(WESP/RTO)
Aliceville, Alabama
July 30, 2015

PERMIT NO. 409-0010


Westervelt Company
Post Office Box 48999
Tuscaloosa, Alabama 35404

Contact: Keith Dollar
Phone: 205/562-5475



*Performed By:*
*Environmental Monitoring Laboratories*
*Ridgeland, Mississippi*
*⮘601/856-3092⮚*

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 624 Ridgewood Road
Ridgeland, Mississippi 39158

Phone: 601/856-3092
Fax 601/853-2151

EXECUTIVE SUMMARY OF AIR EMISSIONS TEST

Westervelt Pellets I, LLC - Aliceville, Alabama – (Emission Point RD)

Report date: August 31, 2015

On July 30, 2015, Environmental Monitoring Laboratories performed air emissions testing for Westervelt Pellets I, LLC in Aliceville, Alabama. Testing was performed to measure total particulate, (TPM including filterable and condensable particulate), carbon monoxide (CO), nitrogen oxides (NOx), total hydrocarbon (VOC as propane), and visible emissions (VE) from the No. 1 WESP/RTO controlling emissions from wood drying operations. This testing was done in accordance with requirements of Air Permit No. 409-0010 issued and administered by the Alabama Department of Environmental Management (ADEM.)

Measured emissions are summarized in the tables below. The results reported are the average of three 60-minute sample runs.

| | lb/hr | concentration | Permit Limit |
|---|---|---|---|
| Total PM (TPM) (Method 5/202) | 1.76 | 0.0072 grains/dscf | 6.97 lb/hr |
| CO | 8.18 | 65 ppm | 53.65 lb/hr |
| NOx | 9.70 | 47 ppm | (no permit limit) |
| VOC (as Propane) | 4.44 | 23 ppm | 15.00 lb/hr |

| | | |
|---|---|---|
| Opacity | 0.00% (highest 6 minute average) | 0.00% (highest 1 hour average) |

Mr. Lance McCray of Westervelt Company coordinated the testing project. The EML test team included Bill Norwood, Wesley Ballard, Eric Renfrow and Greg Shelnutt. Mr. Nolan Williford and Mr. Camaroun Thomas of ADEM were present to witness the test.

Following is a report of the test.

# REPORT OF AIR EMISSIONS TEST
# FOR WESTERVELT RENEWABLE LLC
# NO. 1 WESP/RTO
# ALICEVILLE, ALABAMA
# JULY 30, 2015

## CONTENTS



REPORT CERTIFICATION

I certify that I have examined the information submitted herein, and based upon inquires of those responsible for obtaining the data or upon my direct acquisition of data, I believe the submitted information is true, accurate and complete.

Signed ______________________

Daniel G. Russell

# *1.0 TEST RESULTS*

The following table is a summary of the measured flow parameters and test results for emissions testing done on July 30, 2015, for the No. 1 WESP/RTO at Westervelt's wood pellet plant in Aliceville, Alabama.

| Run No. | | 1 | 2 | 3 | AVG |
|---|---|---|---|---|---|
| Date | | 07/30/15 | 07/30/15 | 07/30/15 | ------- |
| Time Start | | 0953 | 1130 | 1315 | ----- |
| Time End | | 1104 | 1250 | 1420 | ----- |
| TOTAL PM | lb/hr | 1.58 | 1.72 | 1.99 | 1.76 |
| TOTAL PM | grains/dscf | 0.0063 | 0.0070 | 0.0081 | 0.0072 |
| VISIBLE EMISSIONS | Highest SMA, % | 0.0 | 0.0 | 0.0 | 0.0 |
| CO EMISSIONS | lb/hr | 7.37 | 8.81 | 8.36 | 8.18 |
| CO EMISSIONS | ppm | 58 | 71 | 67 | 65 |
| NOx EMISSIONS | lb/hr | 9.49 | 9.52 | 10.08 | 9.70 |
| NOx EMISSIONS | ppm | 46 | 47 | 50 | 47 |
| VOC EMISSIONS (as propane) | lb/hr | 4.50 | 4.38 | 4.43 | 4.44 |
| VOC EMISSIONS (as propane) | ppm | 23 | 22 | 23 | 23 |
| VOLUMETRIC FLOW RATE | acfm | 73051 | 72425 | 75000 | 73492 |
| VOLUMETRIC FLOW RATE | dscfm | 29045 | 28464 | 28428 | 28646 |
| VELOCITY | ft./sec. | 38.6 | 38.3 | 39.7 | 38.88 |
| STACK TEMPERATURE | $^{o}$F | 243 | 250 | 247 | 246 |
| MOISTURE | % | 47.2 | 47.4 | 49.5 | 48.0 |
| SAMPLE RATE | % isokinetic | 100 | 105 | 99 | 101 |

## *2.0 SOURCE DESCRIPTION:*

Westervelt Pellets I, LLC in Aliceville, Alabama is a producer of pine wood pellets. Stored green wood flakes are conveyed to a rotary dryer that reduces moisture content from about 50% to about 8%. Dry wood is conveyed to a cyclone for separation of the flakes from the dust. Additional size classification is accomplished with series of screens and the material is stored in dry silos. Material from the dry silos is fed to pellet presses. Formed pellets are transferred to product storage silos for subsequent shipment.

Production rate during the test was 37.1 tons per hour. RTO temperature during testing was an average of 1559.91 degrees F. Operating documentation can be provided by Westervelt is in Appendix E

The Line 1 rotary dryer exhausts to a wet ESP and then to an RTO that exhausts to atmosphere. The RTO exhausts to the atmosphere by way of a 47.75-inch by 95.5-inch rectangular vertical stack. Four sample ports are provided along the longer dimension at a location that is 180 inches (2.8 diameters) below the stack exit and 180 inches (4.8 diameters) above the blower to stack.

# *3.0 TEST PROCEDURES:*

Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. All test parameters were measured simultaneously. The test consisted of triplicate 60-minute sample runs.

## *Sample and Velocity Traverses – EPA Method 1*

Selection of sampling locations was as described in Method 1. Sample ports are installed at locations meeting requirements of the Method. Laminar airflow at sample locations was confirmed using the null Pitot technique.

## *Determination of Stack Gas Velocity and Volumetric Flow Rate – EPA Method 2*

Stack gas velocity was measured using an S-Type Pitot tube and Method 2. Pitot tube design and its orientation with respect to the sample probe and nozzle permitted the use of a correction factor (Cp) of 0.84 as described in Method 2. Stack temperature measurements were made with a type K thermocouple and NBS calibration traceable digital thermometer.

## *Gas Analysis for the Determination of Dry Molecular Weight – EPA Method 3A*

Oxygen and carbon dioxide content was measured by continuous monitoring with calibrated analyzers as described in Method 3A. Zero and mid level span checks were performed following each sample run. Pre test calibrations were made by introducing the gas standards at the inlet to the sample conditioner; post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe

## *Determination of Moisture Content in Stack Gas – EPA Method 4*

Moisture content was determined from volumetric and gravimetric analysis of impinger contents of the Method 5/202 sample train.

## *Determination of Total Particulate Emissions – EPA Method 5 and EPA Method 202*

Particulate emissions were measured as described in Method 5 in conjunction with Method 202. Method. The sample train used was identical to that described in Method 5 except modified to accommodate the collection of condensable particulate as described in the Method 202. Glass fiber filters were used for the filterable particulate; a hexane extracted Teflon filter was used in the Method 202 section. A glass probe liner and nozzle were used. Reagent grade acetone, water, and hexane were used for sample recovery. Enthalpy Analytical performed the analysis.

## *Determination of Nitrogen Oxides Emissions – EPA Method 7E*

Nitrogen oxide was measured by continuously directing a conditioned gas sample to a TECO Model 42C chemiluminescence NOx analyzer as described in Method 7E. A sample was extracted from the source by way of a stainless steel probe, heated sample line, minimum contact moisture knockout trap, glass wool filter and vacuum sample pump. The NOx analyzer was calibrated prior to use in the appropriate range using zero, mid, and high range concentrations of NO in nitrogen. Zero and mid level span checks were performed following each sample run. Pre test calibrations were made by introducing the gas standards at the inlet to the sample conditioner; post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe. Following calibration, analyzer $NO_2$ converter efficiency was checked by directing a known concentration of $NO_2$ in air to the analyzer. For that efficiency check, a response of greater than 90% of the cylinder value indicates satisfactory converter efficiency.

## *Determination of Carbon Monoxide – EPA Method 10*

Carbon monoxide was measured by continuously directing a conditioned gas sample to a TECO Model 48C gas filter correlation CO analyzer as described in the continuous monitoring technique described in Method 10. A sample was extracted from the source by way of a stainless steel probe, minimum contact moisture knockout trap, glass wool filter and vacuum sample pump. The CO analyzer was calibrated prior to use in the appropriate range, using zero, mid range, and span concentrations of CO in nitrogen. Zero and span checks were performed following each 60-minute sample run. Pre test calibrations were made by introducing the gas standards at the inlet to the sample conditioner; post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe.

## *Determination of Total Volatile Organic Compounds – EPA Method 25A*

VOC (as carbon) was measured using Method 25A. A calibrated TECO Model 51 heated flame ionization detector was used to continuously monitor VOC concentration on a wet basis. A sample was directed to the analyzers by way of a Teflon sample line heated to $250^{O}$ F. A helium/hydrogen fuel was used to reduce oxygen synergism impact on the measurements. The instrument was calibrated with known concentrations of propane. For this testing project, results are expressed in terms of propane. Triplicate 60 minute sampling periods constituted a test. Pre test calibrations and post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe.

## *Preparation of Calibration Gases – EPA Method 205*

Calibration gas concentrations were prepared using cylinders of EPA Protocol 1 gas mixtures and an Environics gas diluter verified by Method 205.

## *Data Acquisition.*

Instrument data was recorded on a Fluke Hydra data logger at 5-second intervals and reduced to 60-second averages. The arithmetic average of each instrument's output was used to calculate emissions.

# *4.0 CALCULATIONS*

*Westervelt Renewable Energy - Aliceville, AL*
*RTO PM/CO/NOx/VOC Emissions Test - July 30, 2015*

*Collected Test Data:*

| | | | | RUN 1 | RUN 2 | RUN 3 |
|---|---|---|---|---|---|---|
| | Date | : | | 07/30/15 | 07/30/15 | 07/30/15 |
| | Time start | : | | 0953 | 1130 | 1315 |
| | Time end | : | | 1104 | 1250 | 1420 |
| 1. | As | : | sq ft | 31.5017 | 31.5017 | 31.5017 |
| 2. | Dn | : | in. | 0.365 | 0.365 | 0.365 |
| 3. | Cp | : | dimensionless | 0.84 | 0.84 | 0.84 |
| 4. | Theta | : | minutes | 60.00 | 60.00 | 60.00 |
| 5. | Y | : | dimensionless | 1.002 | 1.002 | 1.002 |
| 6. | Pbar | : | in. Hg | 30.04 | 30.04 | 30.04 |
| 7. | Pg | : | in. H2O | -0.14 | -0.14 | -0.14 |
| 8. | Vm | : | cf (dry gas) | 40.791 | 42.728 | 40.073 |
| 9. | √(ΔP),avg | : | in.H2O^.5 | 0.5813 | 0.5750 | 0.5965 |
| 10. | ΔH | : | in. H2O | 1.5250 | 1.6670 | 1.5229 |
| 11. | ts | : | degrees F | 243.29 | 249.50 | 246.63 |
| 12. | tm | : | degrees F | 82.04 | 88.71 | 91.06 |
| 13. | Vlc | : | ml | 763 | 794.5 | 806 |
| 14. | CO2 | : | percent | 45.21 | 47.23 | 51.50 |
| 15. | O2 | : | percent | 10.75 | 9.40 | 10.04 |
| 16. | CO | : | percent | 0.01 | 0.01 | 0.01 |
| 17. | C,CO | : | ppm | 58 | 71 | 67 |
| 18. | C,NOx | : | ppm | 45.63 | 46.70 | 49.51 |
| 19. | C,VOC | : | ppmw as propane | 11.92 | 11.81 | 11.49 |
| 20. | M,PM | : | milligrams | 6.9 | 6.0 | 10.7 |
| 21. | M,CPM back | : | milligrams (sum of Method 202 fractions ) | 9.6 | 13.0 | 9.8 |

*Westervelt Renewable Energy - Aliceville, AL*

*RTO PM/CO/NOx/VOC Emissions Test - July 30, 2015*

*Calculations:*

| | | | | RUN 1 | RUN 2 | RUN 3 | AVG. |
|---|---|---|---|---|---|---|---|
| 1. | Pm | : | in.Hg<br>(ΔH/13.6)+Pbar | 30.1521 | 30.1626 | 30.1520 | 30.1556 |
| 2. | Ps | : | in. Hg<br>(Pg/13.6)+Pbar | 30.0297 | 30.0297 | 30.0297 | 30.0297 |
| 3. | An | : | sq ft<br>((Dn/24)^2)(3.1416) | 7.27E-04 | 7.27E-04 | 7.27E-04 | 7.27E-04 |
| 4. | Vmstd | : | dscf<br>Vm Y(Pm/Pstd)(Tstd/Tm) | 40.123 | 41.532 | 38.771 | 40.142 |
| 5. | Vwstd | : | scf<br>(.04707cf/ml)(Vlc) | 35.914 | 37.397 | 37.938 | 37.083 |
| 6. | Bws | : | dimensionless<br>Vwstd/(Vwstd+Vmstd) | 0.4723 | 0.4738 | 0.4946 | 0.4802 |
| 7. | Md | : | mol.wt. dry basis<br>.44 CO2+.32 O2+.28(CO+N2) | 35.66 | 35.93 | 36.64 | 36.08 |
| 8. | Ms | : | mol.wt. wet basis<br>Md(1-Bws)+18 Bws | 27.32 | 27.44 | 27.42 | 27.39 |
| 9. | Vs | : | ft/sec<br>Kp Cp (√ΔP)√(Ts/(Ps Ms)) | 38.65 | 38.32 | 39.68 | 38.88 |
| 10. | Q | : | cfm<br>Vs As(60 sec/min) | 73051 | 72425 | 75000 | 73492 |
| 11. | Qstw | : | scfm<br>Q(Ps/Pstd)(Tstd/Ts) | 55044 | 54095 | 56246 | 55129 |
| 12. | Qstd | : | dscfm<br>Qstw(1-Bws) | 29045 | 28464 | 28428 | 28646 |
| 13. | I | : | percent<br>[(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An) | 99.84 | 105.46 | 98.57 | 101.29 |

### *Filterable PM*

| | | | | | RUN 1 | RUN 2 | RUN 3 | AVG. |
|---|---|---|---|---|---|---|---|---|
| 14. | E,PM | : | pounds/hr | (M,PM/Vmstd)(Qstd)(60)/(453590) | 0.66 | 0.54 | 1.04 | 0.75 |
| 15. | C,PM | : | grains/dscf | (M,PM/Vmstd)(.0154 grains/mg) | 0.0026 | 0.0022 | 0.0043 | 0.0030 |

### *Condensable PM*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 16. | E,PM | : | lb/hr | (M,PM/Vmstd)(Qstd)(60)/(453590) | 0.92 | 1.18 | 0.95 | 1.02 |
| 17. | C,PM | : | gr/dscf | (M,PM/Vmstd)(.0154 gr//mg) | 0.0037 | 0.0048 | 0.0039 | 0.0041 |

### *Total PM*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18. | E,PM | : | lb/hr | (M,PM/Vmstd)(Qstd)(60)/(453590) | 1.58 | 1.72 | 1.99 | 1.76 |
| 19. | C,PM | : | gr/dscf | (M,PM/Vmstd)(.0154 gr//mg) | 0.0063 | 0.0070 | 0.0081 | 0.0072 |

### *Carbon Monoxide Emissions*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20. | E,CO | : | pounds/hr | (C,CO*7.2708e-8)(60)(Qstd) | 7.37 | 8.81 | 8.36 | 8.18 |

### *NOx Emissions*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21. | E,NOx | : | pounds/hr | (C,NOx*1.194e-7)(60)(Qstd) | 9.49 | 9.52 | 10.08 | 9.70 |

### *VOC Emissions*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22. | C'VOC | : | ppm as propane dry | ((C,VOC))/(1-Bws) | 23 | 22 | 23 | 23 |
| 23. | E,VOC | : | pounds/hr | (C'VOC)(3.116e-8)(Qstd)(60) | 4.50 | 4.38 | 4.43 | 4.44 |

## *Calibration Drift and Bias Corrections:*

| Analyte, units | Level | Cal. Value | Pre-Test | | | | Run No. 1 | | | Run No. 2 | | | Run No. 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cal. Reading | % Cal. Error | Bias Reading | % Bias | Reading | % Bias | % Drift | Reading | % Bias | % Drift | Reading | % Bias | % Drift |
| % CO2 | Low | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Mid | 10.0 | 10.0 | 0.0 | 10.0 | 0.0 | 10.0 | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 |
| | High | 20.0 | 20.0 | 0.0 | | | | | | | | | | | |
| | SPAN = | 20.0 | | | Measured Result | | 45.21 | | | 47.23 | | | 51.50 | | |
| | | | | | Corrected Result | | **45.21** | | | **47.23** | | | **51.50** | | |
| % O2 | Low | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.1 | 0.5 | 0.0 | 0.1 | 0.5 | 0.0 | 0.1 | 0.5 | 0.0 |
| | Mid | 10.5 | 10.5 | 0.0 | 10.4 | 0.5 | 10.4 | 0.5 | 0.0 | 10.4 | 0.5 | 0.0 | 10.4 | 0.5 | 0.0 |
| | High | 20.9 | 20.9 | 0.0 | | | | | | | | | | | |
| | SPAN = | 20.9 | | | Measured Result | | 10.65 | | | 9.32 | | | 9.95 | | |
| | | | | | Corrected Result | | **10.75** | | | **9.40** | | | **10.04** | | |
| ppm CO | Low | 0 | 1 | 0.3 | 1 | 0.0 | 1 | 0.0 | 0.0 | 1 | 0.0 | 0.0 | 0 | 0.0 | 0.3 |
| | Mid | 175 | 174 | 0.3 | 174 | 0.0 | 173 | 0.3 | 0.3 | 175 | 0.3 | 0.6 | 174 | 0.3 | 0.3 |
| | High | 350 | 351 | 0.3 | | | | | | | | | | | |
| | SPAN = | 350 | | | Measured Result | | 58.29 | | | 71.15 | | | 67.51 | | |
| | | | | | Corrected Result | | **58.12** | | | **70.96** | | | **67.40** | | |
| ppm NOx | Low | 0 | -1 | 1.0 | 0 | 1.0 | 1 | 2.0 | 1.0 | 1 | 2.0 | 0.0 | 0 | 0.0 | 1.0 |
| | Mid | 50 | 50 | 0.0 | 50 | 0.0 | 49 | 1.0 | 1.0 | 52 | 2.0 | 3.0 | 52 | 2.0 | 0.0 |
| | High | 100 | 100 | 0.0 | | | | | | | | | | | |
| | SPAN = | 100 | | | Measured Result | | 45.21 | | | 47.23 | | | 51.50 | | |
| | | | | | Corrected Result | | **45.63** | | | **46.70** | | | **49.51** | | |

| | | |
|---|---|---|
| Calibration Error Allowable ................ | < 2% of span ............................. | [((Cyl. Value - Reading) / span)* 100%] |
| System Bias .................................. | < 5% span ................................. | [(System Cal - Reading)/span*100%] |
| Drift ............................................ | < 3% ......(Method 20 = 2 %).......... | [(Initial System Cal. - Final System Cal.) / Span * 100%] |

## *5.0 NOMENCLATURE*

| SYMBOL | UNITS | DESCRIPTION |
|---|---|---|
| An | $ft^2$ | Nozzle cross sectional area |
| As | $ft^2$ | Stack cross sectional area |
| Bws | dimensionless | Wet gas fraction |
| $CO_2$ | percent | Carbon dioxide content by volume |
| CO | percent | Carbon monoxide content by volume |
| Cp | dimensionless | Pitot correction factor |
| C,X | as labeled | Concentration of pollutant X |
| DGF | dimensionless | Dry gas fraction |
| Dn | inches | Nozzle diameter |
| $\Delta$H (delta H) | in. $H_2O$ | Pressure drop across meter orifice |
| $\Delta$P (delta P) | in. $H_2O$ | Stack gas velocity pressure |
| E,X | #/hr | Emission rate of pollutant X |
| E'X | #/MM Btu | Emission rate of pollutant X |
| F | dscf | Volume of flue gas per MM Btu |
| I | percent | Nozzle velocity/stack gas velocity |
| Kp | consistent | Pitot tube constant |
| M,X | milligrams | Sample weight of pollutant X |
| Md | #/# mole | Dry molecular weight of stack gas |
| Ms | #/# mole | Wet molecular weight of stack gas |
| N2 | percent | Nitrogen content by volume, dry basis |
| $O_2$ | percent | Oxygen content by volume, dry basis |
| Pbar | in. Hg | Barometric pressure |
| Pg | in. Hg | Stack static pressure |
| Pm | in. Hg | Total pressure at meter (Pbar+($\Delta$H/13.6) |
| Ps | in. Hg | Total stack pressure (Pbar+(Pg/13.6)) |
| Pstd | in. Hg | Standard barometric pressure = 29.92 |
| Q | acfm | Volumetric flow rate at stack conditions |
| Qstd | dscfm | Volumetric flow rate at standard conditions, dry basis |
| Qstdw | scfm | Volumetric flow rate at standard conditions, wet basis |
| $\theta$ (theta) | minutes | Sample duration |
| tm | $^oF$ | Meter temperature (Tm denotes $^oR$) |
| ts | $^oF$ | Stack temperature (Ts denotes $^oR$) |
| tw | $^oF$ | Stack gas wet bulb temperature |
| Tstd | $^oR$ | Standard temperature = 528$^oR$ |
| Vlc | ml | volume of water collected |
| Vm | $ft^3$ | Volume of dry gas sampled through meter |
| Vmstd | dscf | Sample volume at standard conditions |
| Vwstd | scf | Sample volume of water vapor |
| Y | dimensionless | Meter coefficient |
| Xsair | percent | Excess air |

# *6.0 CALIBRATIONS*

Measurement devices used by Environmental Monitoring Laboratories that are subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

*Dry Gas Meter:*

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired. Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. Midsouth Meter Service in Florence, Mississippi provides this service. At 6-month intervals, or following any meter repair a five point calibration is performed described in APTD-0576 using either a wet test meter, calibrated dry gas meter (used exclusively for calibrations), or a calibrated orifice set as a standard reference. Following field use, gas meter calibrations are checked at intermediate orifice settings. If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

*Orifice:*

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration. The calibration is included with the Dry Gas Meter Calibration.

*Nozzles:*

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

*Pitot Tubes:*

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those Pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration that it retains unless damaged.

*Temperature Measuring Instruments:*

All temperature measurements are made with type K thermocouples and digital thermocouple thermometers that have an initial calibration traceable to NBS. Additionally, thermocouple meters are checked annually for ± 2 degree accuracy using an electronic Fluke calibrator that is calibrated annually by the manufacturer. Thermocouples are checked during a test series against a reference thermometer. Continuity and proper thermocouple contact location are checked by challenging the thermocouple with a temperature change. (EMC Alternate Method (ALT-011))

*Barometer:*

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

*Differential Pressure Gauges:*

Velocity head ($\Delta P$) and orifice pressure differential ($\Delta H$) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration. When Magnehelic® type gauges are used, they are calibrated against a water manometer prior to and following each use.

*Analytical Balance:*

Analytical balances are calibrated annually by Mettler-Toledo. Prior to each use, or daily, a quality control check is made using Class A weights of 0.5000 grams and 100.0000 grams. This check is conducted after leveling the balance and performing an internal zero and calibration.

## *7.0 APPENDICES*

A. *Field and Analytical Data and VE Record*

B. *Calibration Data and VE Reader Certification*

C. *Analyzers Data Log*

D. *Condensable PM Analysis (Enthalpy)*

E. *Operating Records*

# *APPENDIX A*

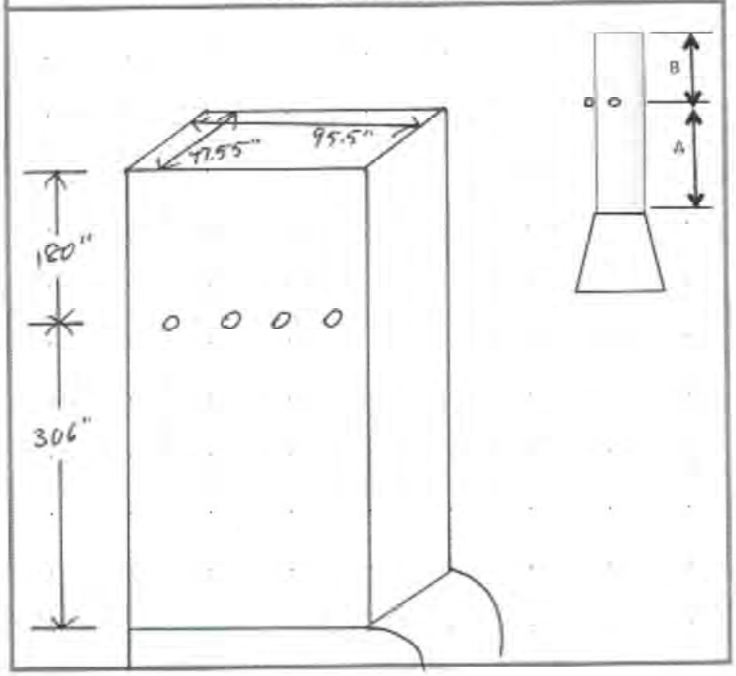
# *FIELD AND ANALYTICAL DATA*

# *AND VE RECORD*

## STACK CONFIGURATION AND SAMPLE POINT LAYOUT (EML V-0 Effective 093013)

**PLANT:** Westervelt Renewable Energy  **Date:** 7-30-15
**SOURCE:** RTO 1
**TEST FOR:** PM Setup
**TEST OPERATORS:** Norwood/Renfrow/Shelnutt/Ballard

### SKETCH OF STACK




### PERCENT OF DIAMETER (for circular stacks)

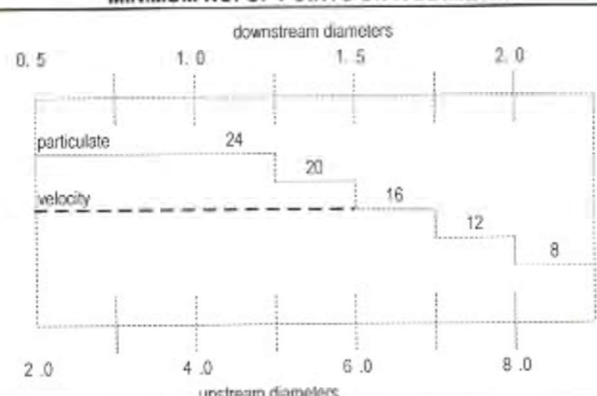
| point no. | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|
| 1 | 14.6 | 6.7 | 4.4 | 3.2 | 2.6 | 2.1 | 1.8 | 1.6 |
| 2 | 85.4 | 25.0 | 14.6 | 10.5 | 8.2 | 6.7 | 5.7 | 4.9 |
| 3 | | 75.0 | 29.6 | 19.4 | 14.6 | 11.8 | 9.9 | 8.5 |
| 4 | | 93.3 | 70.4 | 32.3 | 22.6 | 17.7 | 14.6 | 12.5 |
| 5 | | | 85.4 | 67.7 | 34.2 | 25.0 | 20.1 | 16.9 |
| 6 | | | 95.6 | 80.6 | 65.8 | 35.6 | 26.9 | 22.0 |
| 7 | | | | 89.5 | 77.4 | 64.4 | 36.6 | 28.3 |
| 8 | | | | 96.8 | 85.4 | 75.0 | 63.4 | 37.5 |
| 9 | | | | | 91.8 | 82.3 | 73.1 | 62.5 |
| 10 | | | | | 97.4 | 88.2 | 79.9 | 71.7 |
| 11 | | | | | | 93.3 | 85.4 | 78.0 |
| 12 | | | | | | 97.9 | 90.1 | 83.1 |
| 13 | | | | | | | 94.3 | 87.5 |
| 14 | | | | | | | 98.2 | 91.5 |
| 15 | | | | | | | | 95.1 |
| 16 | | | | | | | | 98.4 |

| Point No. | inches from wall | velocity head |
|---|---|---|
| 1 | 4.0 | |
| 2 | 11.9 | |
| 3 | 19.8 | |
| 4 | 27.8 | |
| 5 | 35.7 | |
| 6 | 43.7 | |

**STACK DIAMETER:** 47.55" x 95.5"  De = 63.66
Distance from ports to disturbance:
A. to upstream disturbance: 306"
B. to downstream disturbance: 180"
Upstream diameters: 4.8
Downstream diameters: 2.0
Minimum No. sample points required: 24
No. sample points selected: 6 x 4
Port Length: 6.5"
Port Type: 4"
Port Access: Platform

Pitot ID: 5'  Pitot Cp: 0.84  Stack Temp: 270
Remarks:

### MINIMUM NO. OF POINTS ON A DIAMETER



Plant: Westervelt RE — Aliceville, AL

Source: RTO 1

Test For: PM202 - NOx - VOC - CO - VE

Test Operators: Norwood · Ballard · Shelnutt - Renfrow

**RUN NO.** 1

Date 7-30-15

Time start 0953 end 1104

| | |
|---|---|
| Meter Box | N4 Y=1.002 |
| Sample Box | 202-1 |
| Probe/Pitot | 5' Tef. |
| Pitot Cp | 0.84 |
| Nozzle Dia. | 0.365 |
| Filter No. | 2596 |
| Amb. Temp. °F | 84 |
| Bar. Press. "Hg | 30.04 |
| Static Press. "$H_2O$ | -0.14 |

No. Sample Pts. 6x4

Minutes/Pt. 2.5

K FACTOR SETUP

| | |
|---|---|
| ΔH@ | 1.79 |
| Meter Temp | 80 |
| %$H_2O$ | 45 |
| Stack Temp | 270 |
| K Factor | 4.48 |

GAS ANALYSIS: CEM

| | | | |
|---|---|---|---|
| $CO_2$ | | | |
| $O_2$ | | | |
| CO | | | |
| Time | | | |

CONDENSATE ~~N648~~ 748 (073015)

init. 100 final 103

SILICA GEL

init. 868 final 880

Notes:

ADEM - Camaroun Thomas

| Port | Point | Elapsed Time Min/sec | DGM Reading Ft³ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp Temp CF °F | Imp Temp I | VAC in. Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 00 | 873.177 | 0.25 | 1.10 | 274 | 80 | 77 | 259 | 74 | 67 | 3 |
| | 2 | 2 30 | 874.7 | 0.39 | 1.75 | 274 | 80 | 77 | 268 | 70 | 66 | 3 |
| | 3 | 5 00 | 876.5 | 0.30 | 1.35 | 266 | 80 | 78 | 269 | 68 | 65 | 6 |
| | 4 | 7 30 | 878.0 | 0.41 | 1.85 | 237 | 81 | 78 | 271 | 65 | 65 | 8 |
| | 5 | 10 00 | 879.9 | 0.28 | 1.25 | 220 | 81 | 78 | 265 | 66 | 63 | 8 |
| | 6 | 12 30 | 881.5 | 0.25 | 1.10 | 210 | 81 | 78 | 265 | 67 | 65 | 8 |
| 2 | 1 | 15/00 | 882.938 | 0.25 | 1.10 | 267 | 82 | 79 | 267 | 71 | 68 | 4 |
| | 2 | 2 30 | 884.3 | 0.40 | 1.80 | 224 | 83 | 79 | 271 | 76 | 66 | 8 |
| | 3 | 5 00 | 886.2 | 0.32 | 1.45 | 222 | 83 | 79 | 266 | 80 | 65 | 9 |
| | 4 | 7 30 | 888.0 | 0.36 | 1.60 | 226 | 84 | 80 | 263 | 74 | 65 | 9 |
| | 5 | 10 00 | 889.8 | 0.45 | 2.00 | 239 | 84 | 80 | 268 | 74 | 65 | 9 |
| | 6 | 12 30 | 891.9 | 0.45 | 2.00 | 271 | 84 | 80 | 259 | 70 | 67 | 9 |
| 3 | 1 | 30/00 | 893.542 | 0.28 | 1.25 | 275 | 84 | 80 | 266 | 70 | 68 | 4 |
| | 2 | 2 30 | 895.1 | 0.38 | 1.70 | 247 | 85 | 81 | 268 | 70 | 67 | 8 |
| | 3 | 5 00 | 896.8 | 0.30 | 1.35 | 225 | 85 | 81 | 263 | 73 | 67 | 8 |
| | 4 | 7 30 | 898.6 | 0.41 | 1.85 | 220 | 85 | 81 | 259 | 76 | 66 | 8 |
| | 5 | 10 00 | 900.3 | 0.41 | 1.85 | 235 | 86 | 81 | 262 | 80 | 66 | 9 |
| | 6 | 12 30 | 902.2 | 0.38 | 1.70 | 255 | 86 | 82 | 260 | 82 | 66 | 9 |
| 4 | 1 | 45/00 | 904.010 | 0.38 | 1.70 | 263 | 86 | 82 | 262 | 77 | 68 | 8 |
| | 2 | 2 30 | 905.8 | 0.25 | 1.10 | 231 | 86 | 82 | 263 | 71 | 68 | 8 |
| | 3 | 5 00 | 907.3 | 0.38 | 1.70 | 223 | 87 | 82 | 271 | 68 | 68 | 7 |
| | 4 | 7 30 | 909.1 | 0.28 | 1.25 | 235 | 87 | 83 | 270 | 70 | 68 | 7 |
| | 5 | 10 00 | 910.7 | 0.25 | 1.10 | 265 | 87 | 83 | 260 | 70 | 68 | 7 |
| | 6 | 12 30 | 912.2 | 0.38 | 1.70 | 235 | 87 | 83 | 266 | 70 | 68 | 7 |
| END | | 60/00 | 913.968 | | | | | | | | | |
| | | | 40.791 | 0.5813 | 1.5250 | 243.29 | | 82.04 | | | | |

COMPLETED mcr 8/6/15

Leak Checks: Sample Train 0.068 0.070 0.002 cfm @ 13 "Hg; Pitot Tubes High ✓ @ 7.4 "$H_2O$ ‖ Low ✓ @ 6.6 "$H_2O$

Pretest: Sample Train ✓ Pitot Tubes ✓

ENVIRONMENTAL MONITORING LABORATORIES, INC. / RIDGELAND, MISSISSIPPI / 601-856-3092

Plant: Westervelt RE Aliceville, AL
Source: RTO 1
Test For: PM-202
Test Operators: Norwood · Shelnutt · Ballard · Renfrow

**RUN NO.** 2
Date 7-30-15
Time start 1130 end 1250

| | |
|---|---|
| Meter Box | N4 Y-1.002 |
| Sample Box | 2020 |
| Probe/Pitot | 5' Tef |
| Pitot Cp | 0.84 |
| Nozzle Dia | 0.365 |
| Filter No | 2597 |
| Amb. Temp. °F | 92 |
| Bar. Press. "Hg | 30.04 |
| Static Press. "$H_2O$ | -0.14 |

No. Sample Pts 6x4
Minutes/Pt 2.5

K FACTOR SETUP

| | |
|---|---|
| ΔH@ | 1.79 |
| Meter Temp | 85 |
| %$H_2O$ | 43 |
| Stack Temp. | 245 |
| K Factor | 5.07 |

GAS ANALYSIS: CEM

| | | | |
|---|---|---|---|
| $CO_2$ | | | |
| $O_2$ | | | |
| CO | | | |
| Time | | | |

CONDENSATE init. 100 final 105
SILICA GEL init. 867.5 final 880

Notes:

| Port | Point | Elapsed Time Min/sec | DGM Reading Ft.³ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp Temp °F CF | Imp Temp °F I | VAC in Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0:00 | 914.217 | 0.25 | 1.10 | 228 | 89 | 85 | 266 | 87 | 68 | 3 |
| | 2 | 2:30 | 916.4 | 0.41 | 2.10 | 247 | 89 | 86 | 263 | 85 | 68 | 8 |
| | 3 | 5:00 | 918.6 | 0.30 | 1.50 | 242 | 89 | 86 | 267 | 73 | 53 | 8 |
| | 4 | 7:30 | 920.3 | 0.41 | 2.10 | 225 | 89 | 86 | 255 | 70 | 51 | 8 |
| | 5 | 10:00 | 922.1 | 0.41 | 2.10 | 278 | 90 | 86 | 258 | 68 | 49 | 9 |
| | 6 | 12:30 | 924.1 | 0.25 | 1.10 | 266 | 90 | 86 | 267 | 68 | 51 | 7 |
| 2 | 1 | 15/00 | 925.536 | 0.28 | 1.40 | 223 | 89 | 86 | 262 | 71 | 63 | 4 |
| | 2 | 2:30 | 927.1 | 0.32 | 1.60 | 274 | 90 | 86 | 264 | 68 | 54 | 4 |
| | 3 | 5:00 | 928.9 | 0.41 | 2.10 | 255 | 90 | 86 | 263 | 68 | 54 | 8 |
| | 4 | 7:30 | 931.0 | 0.41 | 2.10 | 257 | 91 | 87 | 263 | 69 | 55 | 9 |
| | 5 | 10:00 | 933.5 | 0.41 | 2.10 | 279 | 91 | 87 | 261 | 71 | 56 | 9 |
| | 6 | 12:30 | 935.1 | 0.34 | 1.70 | 260 | 91 | 87 | 263 | 71 | 56 | 8 |
| 3 | 1 | 30/00 | 936.635 | 0.25 | 1.10 | 231 | 90 | 87 | 265 | 76 | 68 | 3 |
| | 2 | 2:30 | 938.1 | 0.25 | 1.10 | 250 | 90 | 87 | 265 | 76 | 65 | 3 |
| | 3 | 5:00 | 939.3 | 0.30 | 1.50 | 223 | 91 | 87 | 266 | 76 | 62 | 3 |
| | 4 | 7:30 | 940.9 | 0.32 | 1.60 | 287 | 91 | 87 | 268 | 72 | 59 | 6 |
| | 5 | 10:00 | 942.6 | 0.45 | 2.30 | 233 | 91 | 87 | 264 | 69 | 58 | 9 |
| | 6 | 12:30 | 944.7 | 0.36 | 1.80 | 258 | 92 | 87 | 260 | 65 | 57 | 9 |
| 4 | 1 | 45/00 | 946.591 | 0.21 | 1.10 | 233 | 91 | 88 | 261 | 68 | 62 | 3 |
| | 2 | 2:30 | 948.0 | 0.32 | 1.60 | 223 | 92 | 88 | 260 | 68 | 58 | 4 |
| | 3 | 5:00 | 949.6 | 0.40 | 2.05 | 278 | 92 | 88 | 261 | 72 | 58 | 8 |
| | 4 | 7:30 | 951.5 | 0.28 | 1.40 | 266 | 92 | 88 | 264 | 72 | 58 | 9 |
| | 5 | 10:00 | 953.3 | 0.40 | 2.05 | 241 | 92 | 88 | 262 | 74 | 58 | 9 |
| | 6 | 12:30 | 955.2 | 0.28 | 1.40 | 231 | 92 | 88 | 266 | 76 | 60 | 9 |
| END | | 60/00 | 956.945 | | | | | | | | | |
| | | | 42.728 | 0.5750 | 1.6667 | 249.50 | | 88.71 | | | | |

COMPLETED mcr 8-6-15

Leak Checks: Sample Train 0.040 – 0.044 0.004 cfm @ 12 "Hg
Pitot Tubes High ✓ @ 6.2 "$H_2O$ Low ✓ @ 7.0 "$H_2O$
Pretest: Sample Train ✓ Pitot Tubes ✓

Plant: Westervelt RF  Aliceville, AL
Source: RTO 1
Test For: PM-202
Test Operators: Norwood: Shelnutt: Ballard: Renfrow

**RUN NO.** 3
Date 7-30-15
Time start 1315 end 1420

| | | | | | |
|---|---|---|---|---|---|
| Meter Box | N4 Y=1.002 | No. Sample Pts. | 6x4 | GAS ANALYSIS: | CEM |
| Sample Box | 202-1 | Minutes/Pt. | 2.5 | $CO_2$ | |
| Probe/Pitot | 5'Tef. | | | $O_2$ | |
| Pitot Cp | 0.84 | K FACTOR SETUP | | CO | |
| Nozzle Dia. | 0.365 | ΔH@ | 1.79 | Time | |
| Filter No. | 2598 | Meter Temp | 90 | | |
| | | %H2O | 48 | CONDENSATE: | 780 |
| Amb. Temp. °F | 95 | Stack Temp | 250 | init. 100 | final 113 |
| Bar. Press. "Hg | 30.04 | K Factor | 4.23 | SILICA GEL init. 885 | final 898 |
| Static Press. "$H_2O$ | -0.14 | | | | |

Notes:

| Port | Point | Elapsed Time Min/sec | DGM Reading Ft³ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp. Temp CPT | Imp. Temp I | VAC in. Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 00 | 959.957 | 0.30 | 1.50 | 231 | 92 | 88 | 255 | 85 | 67 | 6 |
| | 2 | 2 30 | 961.7 | 0.25 | 1.05 | 224 | 92 | 89 | 258 | 84 | 68 | 7 |
| | 3 | 5 00 | 963.1 | 0.25 | 1.05 | 246 | 92 | 89 | 256 | 82 | 67 | 7 |
| | 4 | 7 30 | 965.0 | 0.40 | 1.70 | 278 | 92 | 89 | 264 | 79 | 65 | 9 |
| | 5 | 10 00 | 966.4 | 0.40 | 1.70 | 272 | 92 | 89 | 266 | 74 | 65 | 9 |
| | 6 | 12 30 | 967.9 | 0.35 | 1.50 | 241 | 92 | 89 | 265 | 74 | 65 | 8 |
| 2 | 1 | 15/00 | 969.623 | 0.30 | 1.25 | 263 | 92 | 89 | 267 | 72 | 68 | 5 |
| | 2 | 2 30 | 971.1 | 0.43 | 1.80 | 241 | 92 | 89 | 269 | 73 | 67 | 8 |
| | 3 | 5 00 | 973.0 | 0.33 | 1.40 | 224 | 92 | 89 | 260 | 72 | 67 | 8 |
| | 4 | 7 30 | 974.6 | 0.38 | 1.60 | 230 | 92 | 89 | 269 | 73 | 67 | 8 |
| | 5 | 10 00 | 976.4 | 0.42 | 1.75 | 255 | 93 | 89 | 262 | 75 | 67 | 8 |
| | 6 | 12 30 | 978.2 | 0.42 | 1.75 | 241 | 93 | 89 | 263 | 78 | 68 | 9 |
| 3 | 1 | 30/00 | 980.055 | 0.30 | 1.30 | 228 | 93 | 89 | 256 | 77 | 68 | 7 |
| | 2 | 2 30 | 981.5 | 0.34 | 1.45 | 256 | 93 | 89 | 266 | 78 | 68 | 8 |
| | 3 | 5 00 | 983.2 | 0.30 | 1.85 | 253 | 93 | 89 | 259 | 75 | 69 | 8 |
| | 4 | 7 30 | 984.8 | 0.48 | 2.05 | 262 | 93 | 89 | 261 | 74 | 69 | 8 |
| | 5 | 10 00 | 986.4 | 0.42 | 1.75 | 224 | 93 | 90 | 268 | 72 | 69 | 9 |
| | 6 | 12 30 | 988.2 | 0.42 | 1.75 | 251 | 94 | 90 | 266 | 72 | 69 | 9 |
| 4 | 1 | 45/00 | 990.069 | 0.31 | 1.30 | 227 | 93 | 90 | 264 | 78 | 69 | 8 |
| | 2 | 2 30 | 991.5 | 0.27 | 1.15 | 264 | 94 | 90 | 267 | 75 | 67 | 8 |
| | 3 | 5 00 | 993.0 | 0.43 | 1.80 | 279 | 94 | 90 | 263 | 74 | 65 | 9 |
| | 4 | 7 30 | 994.7 | 0.26 | 1.10 | 230 | 94 | 90 | 259 | 74 | 65 | 7 |
| | 5 | 10 00 | 996.3 | 0.43 | 1.80 | 230 | 94 | 90 | 270 | 75 | 67 | 7 |
| | 6 | 12 30 | 998.1 | 0.43 | 1.80 | 269 | 94 | 90 | 268 | 75 | 67 | 8 |
| END | | 60/00 | 000.030 | | | | | | | | | |
| | | | 40.073 | 0.5965 | 1.5229 | ~~242.88~~ 246.63 | | 91.06 | | | | |

COMPLETE mcr 8-6-15

Leak Checks: Sample Train 0.025 → 0.028  0.003 cfm @ 13 "Hg
Pitot Tubes High ✓ @ 6.2 "$H_2O$ ‖ Low ✓ @ 5.9 "$H_2O$
Pretest: Sample Train ✓ Pitot Tubes ✓

## PARTICULATE CATCH ANALYSIS (EML V-0 Effective 093013)

SAMPLES: Westervelt RE No. 1 RTO

DATE TAKEN: 7-29-15 DATE ANALYZED: ~~7-30-15~~ 7-31-15

DELIVERED BY: Norwood RECEIVED BY: Russell

ANALYZED BY: Russell

(Attach chain of custody if additional exchanges occur)

FILTERS:

| RUN NO. | 1 | 2 | 3 | |
|---|---|---|---|---|
| FILTER NO. | 2596 | 2597 | 2598 | |
| FILTER TARE, gms. | 0.2799 | 0.2825 | 0.2815 | |
| 080315 0815 | 0.2817 | 0.2841 | 0.2864 | |
| 080315 1510 | 0.2815 | 0.2839 | 0.2863 | |
| | | | | |
| FINAL WEIGHT, gms. | 0.2815 | 0.2839 | 0.2863 | |
| NET GAIN, gms. | 0.0016 | 0.0014 | 0.0048 | |

PROBE WASH: Wash Solvent ______ Lot No. ______

| RUN NO. | 1 | 2 | 3 | BLANK |
|---|---|---|---|---|
| CONTAINER I.D. | WV RTO1 R1 | WV RTO1 R2 | WV RTO1 R3 | BLANK |
| VOLUME INTACT? | ✓ | ✓ | ✓ | Lot # ~~H7.6~~ |
| VOLUME, ml | 125 | 125 | 125 | 200 |
| | (302) | (617) | (619) | (42) |
| TARE WEIGHT, gms. | 107.2862 | 105.2083 | 103.6177 | 117.6426 |
| 080315 0830 | 107.2916 | 105.2130 | 103.6236 | 117.6424 |
| 080315 1510 | 107.2915 | 105.2129 | 103.6236 | |
| | | | | |
| FINAL WEIGHT, gms | 107.2915 | 105.2129 | 103.6236 | 117.6424 |
| NET GAIN, gms. | 0.0053 | 0.0046 | 0.0059 | |
| LESS BLANK, gms. | -0- | -0- | -0- | |

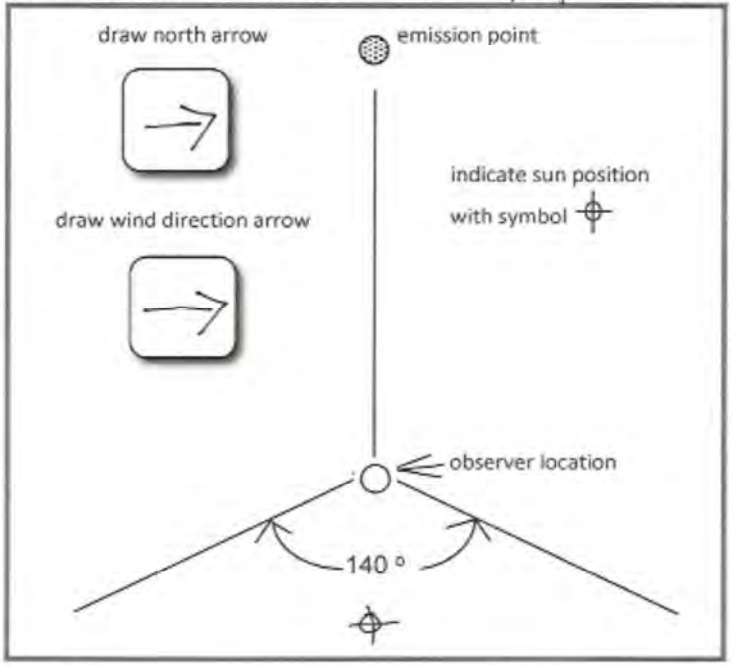
PARTICULATE SAMPLE WEIGHT:

| RUN NO. | 1 | 2 | 3 | |
|---|---|---|---|---|
| filter + probe, mg. | 6.9 | 6.0 | 10.7 | COMPLETED MCB 08-07-15 |

 R1

**PLANT** Westervelt RE Aliceville, AL
Emission Point RTO #1
Date 7-30-15
Stack height 40'
Distance to source 100'
Direction from source EAST

| CONDITIONS | START | STOP |
|---|---|---|
| Time | 953 | 1053 |
| Wind direction | South | NE |
| Wind speed | 5-10 | 5-10 |
| Ambient temp. °F | 84 | 87 |
| Sky cover | clear | clear |
| Plume color | N/A | N/A |
| Plume background | sky | sky |




Condensing water vapor? Yes Detached [x] G.S. Attached [x] Distance visible 90'

| min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 56 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 |

Remarks:

COMPLETED MCR 8-6-15

Avg. opacity for period: 0.0 Highest six minute average: 0.0
Other data reduction:

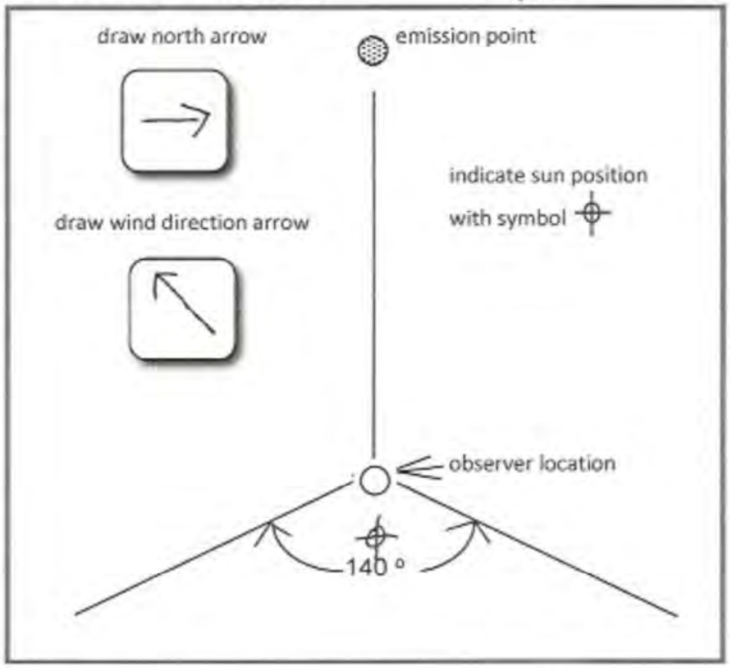
Observer: Greg Shelnutt date certified: 4-16-15 Signature: G. Shelnutt

VISIBLE EMISSIONS EVALUATION RECORD (EML V-0 Effective 093013)

R2

| | |
|---|---|
| PLANT | Westervelt RE Aliceville, AL |
| Emission Point | RTO #1 |
| Date | 7-30-15 |
| Stack height | 40' |
| Distance to source | 100' |
| Direction from source | EAST |

| CONDITIONS | START | STOP |
|---|---|---|
| Time | 1130 | 1230 |
| Wind direction | NE | NE |
| Wind speed | 5-10 | 5-10 |
| Ambient temp. °F | 92 | 94 |
| Sky cover | p. cloudy | p. cloudy |
| Plume color | N/A | N/A |
| Plume background | sky | sky |




Condensing water vapor? yes Detached ☑ Attached ☐ Distance visible 100'

| min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 56 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 |

Remarks:

COMPLETED MCB 8-6-15

Avg. opacity for period: 0.0 Highest six minute average: 0.0

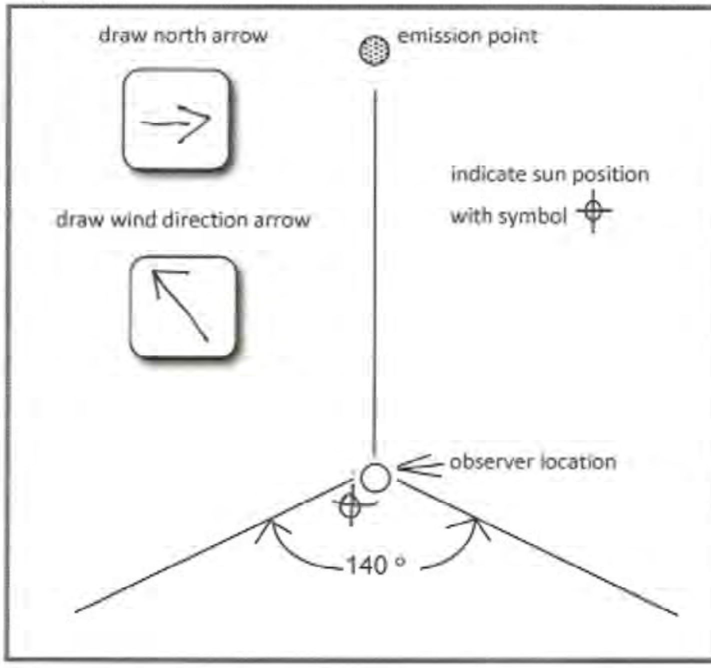
Other data reduction:

Observer: Greg Shelnutt date certified: 4-16-15 Signature: [signature]

123

PLANT Westervelt RE Aliceville, AL
Emission Point RTO #1
Date 7-30-15
Stack height 40'
Distance to source 100'
Direction from source EAST

| CONDITIONS | START | STOP |
|---|---|---|
| Time | 1315 | 1415 |
| Wind direction | NE | NE |
| Wind speed | 5-10 | 5-10 |
| Ambient temp. °F | 95 | 94 |
| Sky cover | P. cloudy | P. cloudy |
| Plume color | N/A | N/A |
| Plume background | Sky | Sky |




Condensing water vapor? Yes Detached [X] Attached [ ] Distance visible 100'

| min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 | min | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 56 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 |

Remarks:

COMPLETED MCB 8-6-15

Avg. opacity for period: 0.0 Highest six minute average: 0.0
Other data reduction:

Observer: Greg Shelnutt date certified: 4-16-15 Signature: G. Shelnutt

# *APPENDIX B*

# *CALIBRATION DATA AND*

# *VE READER CERTIFICATION*

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 624 Ridgewood Road
Ridgeland, Mississippi 39158

Phone: 601/856-3092
Fax 601/853-2151

May 4, 2015

Mr. Greg Shelnutt
Environmental Monitoring Laboratories, Inc.
P.O. Box 655
Ridgeland, MS 39158

Dear Mr. Shelnutt:

Please be advised that you have successfully participated in the Visible Emissions Evaluation Certification conducted for the Mississippi Department of Environmental Quality (MDEQ), Office of Pollution Control and by Environmental Monitoring Laboratories on April 16 and 17, 2015, in Jackson, Mississippi. You met the following standards as specified in the November 12, 1974, issue of the Federal Register (Volume 39, No. 219, Method 9):

1) Maintained an average deviation of less than 7.5% for sets of 25 white and 25 black smoke readings.
2) Did not have any one reading with a deviation greater than 15%.

The deviations for your qualifying run, Run No. 16-2W were:

| | |
|---|---|
| White Smoke | 4.0% |
| Black Smoke: | 1.8% |

Your certification will expire on October 16, 2015.

The Office of Pollution Control has the original of your test paper. Connie Simmons of the MDEQ can be contacted at 601/961-5171 for assistance concerning this matter.

Very truly yours

ENVIRONMENTAL MONITORING LABORATORIES

Daniel G. Russell

Daniel G. Russell

# DRY GAS METER CALIBRATION
## By Critical Orifice

**Meter ID** Nutech 4 **Date** 07/06/15 DGM 1348734

**Orifice ID** 1312 **By** Shelnutt

**T, Amb** 76 **Pbar** 30.17

| Orifice | | | ΔH | VAC | Time | Meter | | | | | | Vmstd | Vcrstd | Y | ΔH@ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | K' | Q' | in. | in. | min. | Vi | Vf | Temp. in | | Temp out | | | | | |
| | | cfm | $H_2O$ | Hg | | $ft^3$ | $ft^3$ | init. | final | init. | final | | | | |
| 12 | 0.3169 | 0.42 | 0.56 | 21 | 16.00 | 546.149 | 552.937 | 77 | 77 | 76 | 76 | 6.736 | 6.675 | 0.991 | 1.789 |
| 17 | 0.4391 | 0.58 | 1.10 | 20 | 9.00 | 552.937 | 558.219 | 77 | 77 | 76 | 76 | 5.242 | 5.185 | 0.989 | 1.840 |
| 23 | 0.6091 | 0.80 | 2.10 | 17 | 8.00 | 558.219 | 564.686 | 77 | 77 | 76 | 76 | 6.418 | 6.357 | 0.991 | 1.842 |
| 26 | 0.6905 | 0.92 | 2.70 | 15 | 8.00 | 564.686 | 572.020 | 77 | 78 | 76 | 76 | 7.275 | 7.311 | 1.005 | 1.788 |
| 31 | 0.8293 | 1.10 | 3.70 | 12 | 5.00 | 572.020 | 577.337 | 78 | 78 | 76 | 76 | 5.272 | 5.463 | 1.036 | 1.710 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 1.002 | 1.79 |

Calculations:

Vm = [Vf-Vi]

Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]

Vcrstd = K'[(Pbar)(θ)/(T,amb)]

Y = [(Vcrstd/Vmstd)]

Q = [(Vm/θ)(Tm out/Tm)(Y)]

K = [Q(√((Pm Mm)/((Tm out)(ΔH))]

ΔH@ = $[0.921/K^2]$

Where:

Pbar = Barometric pressure; in. Hg

Tm = Average Temp. at meter, $^oR$

Pm = Meter pressure, (Pbar + DH/13.6); in. Hg

Mm = molecular weight of air (29)

Y = Meter correction factor; dimensionless

# DRY GAS METER CALIBRATION
## By Critical Orifice

**Meter ID** Nutech 4 **Date** 07/31/15 DGM 1348734

**Orifice ID** 1312 **By** Norwood

**T, Amb** 90 **Pbar** 29.88

| Orifice | | | ΔH | VAC | Time | Meter | | | | | | Vmstd | Vcrstd | Y | ΔH@ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | K' | Q' | in. | in. | min. | Vi | Vf | Temp. in | | Temp out | | | | | |
| | | cfm | $H_2O$ | Hg | | $ft^3$ | $ft^3$ | init. | final | init. | final | | | | |
| 17 | 0.4391 | 0.58 | 1.15 | 22.0 | 9.00 | 145.800 | 150.994 | 90 | 92 | 88 | 89 | 4.982 | 5.005 | 1.005 | 1.998 |
| 23 | 0.6091 | 0.80 | 2.10 | 21.0 | 7.00 | 150.994 | 156.685 | 93 | 95 | 89 | 90 | 5.439 | 5.369 | 0.987 | 1.910 |
| 26 | 0.6905 | 0.92 | 2.70 | 20.0 | 6.00 | 156.685 | 162.255 | 95 | 96 | 90 | 91 | 5.311 | 5.292 | 0.996 | 1.851 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 0.996 | 1.92 |

*Calculations:*

Vm = [Vf-Vi]

Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]

Vcrstd = K'[(Pbar)(θ)/(T,amb)]

Y = [(Vcrstd/Vmstd)]

Q = [(Vm/θ)(Tm out/Tm)(Y)]

K = [Q(√((Pm Mm)/((Tm out)( ΔH))]

ΔH@ = [$0.921/K^2$]

*Where:*

Pbar = Barometric pressure; in. Hg

Tm = Average Temp. at meter, $^oR$

Pm = Meter pressure, (Pbar + ΔH/13.6); in. Hg

Mm = molecular weight of air (29)

Y = Meter correction factor; dimensionless

ANALYZER CALIBRATION RECORD (EML V-0 Effective 093013)

| | | | |
|---|---|---|---|
| Plant | Westervelt Renewable Energy Aliceville, AL | DATE | 7-30-15 |
| Source | RTO 1 | | |
| Test For | CO - $NO_x$ - VOC | | |
| Operators | Norwood | | |

| Analyte, units / Analyzer ID / Span / DAQ Channel | Level | Cal. Value | Cyl. Ref. | Diluted Y/N | Cal. Reading | Start / End / Bias \ Run | 0953 / 1104 / 1 | 1130 / 1250 / 2 | 1315 / 1420 / 3 |
|---|---|---|---|---|---|---|---|---|---|
| % $CO_2$ | Zero | 0.0 | $N_2$ | N | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1415D3053 | Low | | | | | | | | |
| 20.0 | Mid | 10.0 | 1 | Y | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 2 | High | 20.0 | 1 | Y | 20.0 | | | | |
| % $O_2$ | Zero | 0.0 | $N_2$ | N | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 |
| 1420D3053 | Low | | | | | | | | |
| 20.9 | Mid | 10.5 | $N_2$/Air | Y | 10.5 | 10.4 | 10.4 | 10.4 | 10.4 |
| 3 | High | 20.9 | Air | N | 20.9 | | | | |
| ppm CO | Zero | 0 | Air | N | 1 | 1 | 1 | 1 | 0 |
| 48i0517511690 | Low | 175 | 2 | Y | 174 | 174 | 173 | 175 | 174 |
| 700 | Mid | 350 | 2 | Y | 351 | 351 | | | |
| 4 | High | 700 | 2 | Y | 701 | | | | |
| ppm $NO_x$ | Zero | 0 | Air | N | -1 | 0 | 1 | 1 | 0 |
| 42CHL-56482-308 | Low | | | | | | | | |
| 100 | Mid | 50 | 2 | Y | 50 | 50 | 48 | 52 | 52 |
| 5 | High | 100 | 2 | Y | 100 | | | | |
| ppmw $C_3H_8$ | Zero | 0 | Air | N | | 0.0 | -0.8 | -0.5 | -0.5 |
| VIG2841006 | Low | 30 | 3 | Y | | 29.7 | 28.5 | 28.0 | 28.9 |
| 100 | Mid | 50 | 3 | Y | | 50.1 | | | |
| 8 | High | 80 | 3 | Y | | 80.0 | | | |
| | Zero | | | | | | | | |
| | Low | | | | | | | | |
| | Mid | | | | | | | | |
| | High | | | | | | | | |

| Cylinder Ref. | Cylinder No. | Contents | Expiration Date | Notes: |
|---|---|---|---|---|
| 1 | CC473045 | 17.93% $O_2$, 24.92% $CO_2$ | 7-9-21 | $NO_x$ conv. eff. Cyl. 4 |
| 2 | CC407328 | 2486 ppm CO, 1250 ppm NO | 5-4-23 | 073015 @ 0845 66.5 ppm |
| 3 | CC104311 | 2215 ppm $C_3H_8$ | 9-5-20 | |
| 4 | CC415503 | 69.31 ppm $NO_2$ | 10-16-15 | |

Analyst's signature: Bill Norwood

Method Specifications:

| Methods 3A, 6C, 7E | Method 25A |
|---|---|
| Zero < 20 % of span (can be zero) | Zero < 0.1 % of span |
| Mid = 40 to 60 % of span | Low = 25 to 35 % of span |
| High = span | Mid = 45 to 60 % of span |
| | High = 80 to 90 % of span |

Error Specifications:

| | | |
|---|---|---|
| Calibration Error Allowable | < 2% of span | [[(Cyl. Value - Reading) / span]* 100%] |
| 25A Calibration Error Allowable | < 5% Cyl. Value | [(Cyl. Value - Reading) / (Cyl Value) *100%] |
| System Bias | < 5% span (not for 20 & 25A) | [(System Cal - Reading)/span*100] |
| Drift | < 3% | [(Initial System Cal. - Final System Cal.) / Span * 100%] |
| Method 20 Drift | < 2% | [(initial system cal. - final system cal.) / Span * 100%] |

## METHOD 205 - VERIFICATION OF GAS DILUTION SYSTEMS (EML V-0 Effective 093013)

DATE: 7-29-15

PROJECT: Westervelt - Aliceville, AL

ANALYST: Norwood    SIGNATURE: Bill Norwood

**DILUTION SYSTEM**

| | |
|---|---|
| MAKE | Environics |
| MODEL | 4040-4477 |
| NO. OF DIL. DEVICES | 4 |
| TYPE OF DIL. DEVICE | MFC |

**REFERENCE MONITOR**

| | |
|---|---|
| TYPE | Oxygen |
| MAKE | Servomex |
| MODEL | 1400 |
| SPAN | 20.9 |

| | | | |
|---|---|---|---|
| HIGH LEVEL SUPPLY GAS CONC. | 20.9 | CYLINDER ID | Zero Air |
| MID LEVEL SUPPLY GAS CONC. | 10.5 | CYLINDER ID | CC220330 |
| DILUTION GAS | 0.0 | CYLINDER ID | Zero N2 |

| MFC No. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Target Value | 10.5 | 5.2 | | | | | | | | |

**Injections** **(Triplicate injection of 2 dilutions per MFC to be used)**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1st | 10.5 | 5.2 | | | | | | | | |
| 2nd | 10.5 | 5.2 | | | | | | | | |
| 3rd | 10.5 | 5.2 | | | | | | | | |
| Average | 10.5 | 5.2 | | | | | | | | |

**% Difference = (( target conc. - Avg. conc.)/target conc.)*100** **Must be within 2% of avg.**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1st inject | 0.0 | 0.0 | | | | | | | | |
| 2nd inject | 0.0 | 0.0 | | | | | | | | |
| 3rd inject | 0.0 | 0.0 | | | | | | | | |

**Triplicate injection of Mid Level Gas to Reference Monitor. Must be within 10% of one dilution**

| | Response | % Difference |
|---|---|---|
| 1st | 10.5 | 0.0 |
| 2nd | 10.5 | 0.0 |
| 3rd | 10.5 | 0.0 |
| Average | 10.5 | 0.0 |

Average must be within +/- 2% of the certified gas concentration.

Airgas

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

| | | | |
|---|---|---|---|
| Part Number: | E02NI89E15A1597 | Reference Number: | 122-124402900-1 |
| Cylinder Number: | CC220330 | Cylinder Volume: | 145.3 CF |
| Laboratory: | ASG - Durham - NC | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B22013 | Valve Outlet: | 590 |
| Gas Code: | O2,BALN | Certification Date: | Nov 04, 2013 |

**Expiration Date: Nov 04, 2021**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| OXYGEN | 10.50 % | 10.49 % | G1 | +/- 0.4% NIST Traceable | 11/04/2013 |
| NITROGEN | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 09060211 | CC262370 | 9.961 % OXYGEN/NITROGEN | +/- 0.3% | Nov 08, 2018 |

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Horiba MPA510 O2 41499150042 | Paramagnetic | Oct 24, 2013 |

**Triad Data Available Upon Request**

Signature on file

**Approved for Release**

Airgas

**Airgas Specialty Gases**
630 United Drive
Durham, NC 27713
(919)544-3773 Fax: (919)544-3774
www.airgas.com

# CERTIFICATE OF ANALYSIS
# Grade of Product: EPA Protocol

| | | | |
|---|---|---|---|
| Part Number: | E03NI57E15A0000 | Reference Number: | 122-124382840-1 |
| Cylinder Number: | CC437045 | Cylinder Volume: | 163.9 CF |
| Laboratory: | ASG - Durham - NC | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B22013 | Valve Outlet: | 590 |
| Gas Code: | CO2,O2,BALN | Certification Date: | Jul 09, 2013 |

**Expiration Date: Jul 09, 2021**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

## ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| OXYGEN | 18.00 % | 17.93 % | G1 | +/- 0.4% NIST Traceable | 07/08/2013 |
| CARBON DIOXIDE | 25.00 % | 24.92 % | G2 | +/- .6% NIST Traceable | 07/09/2013 |
| NITROGEN | Balance | | | | |

## CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 09061416 | CC273522 | 22.53 % OXYGEN/NITROGEN | +/- 0.4% | Mar 08, 2019 |
| NTRM | 07120704 | CC214716 | 6.986 % CARBON DIOXIDE/NITROGEN | +/- 0.6% | Mar 23, 2017 |

## ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Horiba VIA510 CO2 42399380022 | Nondispersive Infrared (NDIR) | Jun 24, 2013 |
| Horiba MPA510 O2 41499150042 | Paramagnetic | Jul 03, 2013 |

**Triad Data Available Upon Request**

Notes:

C.J. Williams

**Approved for Release**

Airgas

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

| | | | |
|---|---|---|---|
| Part Number: | E03NI79E15A0015 | Reference Number: | 122-124484613-1 |
| Cylinder Number: | CC14207 | Cylinder Volume: | 157.2 CF |
| Laboratory: | ASG - Durham - NC | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B22015 | Valve Outlet: | 660 |
| Gas Code: | CO2,SO2,BALN | Certification Date: | Mar 30, 2015 |

**Expiration Date: Mar 30, 2023**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| SULFUR DIOXIDE | 2200 PPM | 2184 PPM | G1 | +/- 0.6% NIST Traceable | 03/23/2015, 03/30/2015 |
| CARBON DIOXIDE | 20.00 % | 20.02 % | G1 | +/- 0.7% NIST Traceable | 03/23/2015 |
| NITROGEN | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 12062519 | CC367506 | 2003.2 PPM SULFUR DIOXIDE/NITROGEN | +/- 0.5% | Jun 13, 2018 |
| NTRM | 12061552 | CC354891 | 19.87 % CARBON DIOXIDE/NITROGEN | +/- 0.6% | Jan 27, 2018 |

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Nicolet 6700 AHR0801549 CO2 | FTIR | Mar 12, 2015 |
| Nicolet 6700 AHR0801549 SO2 | FTIR | Mar 12, 2015 |

**Triad Data Available Upon Request**

Signature on file

**Approved for Release**

Airgas

# CERTIFICATE OF ANALYSIS
# Grade of Product: EPA Protocol

**Airgas Specialty Products**
Airgas Specialty Gasses
630 United Drive
Durham, NC 27713
(919)544-3773 Fax: (919)544-3774
www.airgas.com

| | | | |
|---|---|---|---|
| Part Number: | E02AI99E15A0090 | Reference Number: | 122-124334251-1 |
| Cylinder Number: | CC104311 | Cylinder Volume: | 146 Cu.Ft. |
| Laboratory: | ASG - Durham - NC | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B22012 | Valve Outlet: | 590 |
| Gas Code: | APPVD | Analysis Date: | Sep 05, 2012 |

**Expiration Date: Sep 05, 2020**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

## ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty |
|---|---|---|---|---|
| PROPANE | 2200 PPM | 2215 PPM | G1 | +/- 1% NIST Traceable |
| Air | Balance | | | |

## CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Expiration Date |
|---|---|---|---|---|
| NTRM | 010507 | SG872065N | 2579PPM PROPANE/NITROGEN | Mar 30, 2018 |

## ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Nicolet 6700 AHR0801333 C3H8 | FTIR | Aug 15, 2012 |

**Triad Data Available Upon Request**

Notes:

**Approved for Release**

Airgas

# CERTIFICATE OF ANALYSIS

## Grade of Product: CERTIFIED STANDARD-SPEC

Airgas Specialty Gases
630 United Drive
Durham NC 27713
919-544-3773 Fax: 919-544-3774
www.airgas.com

| | | | |
|---|---|---|---|
| Part Number: | X02AI99C15AC038 | Reference Number: | 122-124339171-1 |
| Cylinder Number: | CC415503 | Cylinder Volume: | 146.2 CF |
| Laboratory: | ASG - Durham - NC | Cylinder Pressure: | 2015 PSIG |
| Analysis Date: | Oct 16, 2012 | Valve Outlet: | 660 |

**Expiration Date: Oct 16, 2013**

Product composition verified by direct comparison to calibration standards traceable to NIST ASTM Class 1 weights and/or NIST gas mixture reference materials.

## ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration (Mole %) | Analytical Uncertainty |
|---|---|---|---|
| NITROGEN DIOXIDE | 70.00 PPM | 69.31 PPM | +/- 2% |
| AIR | Balance | | |

Notes:

**Approved for Release**

# CERTIFICATE OF ANALYSIS

## Grade of Product: CERTIFIED STANDARD-SPEC

| | | | |
|---|---|---|---|
| Part Number: | X02AI99C15AC038 | Reference Number: | 122-124392492-1 |
| Cylinder Number: | CC216831 | Cylinder Volume: | 146.2 Cubic Feet |
| Laboratory: | ASG - Durham - NC | Cylinder Pressure: | 2015 PSIG |
| Analysis Date: | Sep 09, 2013 | Valve Outlet: | 660 |
| Lot Number: | 122-124392492-1 | | |

**Expiration Date: Sep 09, 2015**

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

## ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration (Mole %) | Analytical Uncertainty |
|---|---|---|---|
| NITROGEN DIOXIDE | 70.00 PPM | 68.01 PPM | +/- 2% |
| AIR | Balance | | |

Signature on file

**Approved for Release**

# *APPENDIX C*

# *ANALYZERS DATA LOG*

| | % CO2 | % O2 | ppm CO | ppm NOx | ppmw C3H8 | |
|---|---|---|---|---|---|---|
| 07/30/2015 8:05 | 0.1 | 21.0 | 1.0 | -0.5 | -0.5 | |
| 07/30/2015 8:06 | 0.1 | 21.0 | 1.0 | -0.5 | -0.5 | |
| 07/30/2015 8:07 | 0.1 | 21.0 | 1.2 | -0.5 | -0.5 | |
| 07/30/2015 8:08 | 0.1 | 21.0 | 1.1 | -0.5 | -0.5 | |
| 07/30/2015 8:09 | 0.1 | 21.0 | 1.3 | -0.5 | -0.5 | |
| 07/30/2015 8:10 | 0.1 | 16.2 | 2.0 | -0.5 | 11.6 | |
| 07/30/2015 8:11 | 0.0 | 0.5 | 0.7 | -0.5 | 1.8 | |
| 07/30/2015 8:12 | 0.0 | 0.0 | 0.5 | -0.5 | 0.5 | |
| 07/30/2015 8:13 | 0.0 | 0.0 | 0.5 | -0.5 | 1.4 | |
| 07/30/2015 8:14 | 0.0 | 0.0 | 0.5 | -0.5 | -0.2 | |
| 07/30/2015 8:15 | 0.0 | 0.0 | 0.6 | -0.5 | -0.3 | |
| 07/30/2015 8:16 | 0.0 | 0.0 | 0.5 | -0.5 | 1.7 | |
| 07/30/2015 8:17 | 0.1 | 16.1 | 1.0 | -0.5 | 0.0 | |
| 07/30/2015 8:18 | 0.1 | 21.9 | 1.2 | -0.5 | 1.0 | |
| 07/30/2015 8:19 | 0.1 | 20.9 | 1.2 | -0.5 | 0.5 | |
| 07/30/2015 8:20 | 0.1 | 17.8 | 1.2 | -0.5 | 1.5 | |
| 07/30/2015 8:21 | 0.1 | 10.5 | 0.9 | -0.5 | 1.4 | |
| 07/30/2015 8:22 | 0.2 | 11.3 | 0.6 | -0.5 | 0.6 | |
| 07/30/2015 8:23 | 15.3 | 18.3 | 0.0 | -0.5 | 1.5 | |
| 07/30/2015 8:24 | 19.9 | 18.6 | -0.1 | -0.5 | 0.4 | |
| 07/30/2015 8:25 | 20.0 | 18.6 | -0.1 | -0.5 | 0.3 | |
| 07/30/2015 8:26 | 20.0 | 18.6 | -0.1 | -0.5 | -0.6 | |
| 07/30/2015 8:27 | 16.0 | 19.0 | 0.0 | -0.5 | 2.3 | |
| 07/30/2015 8:28 | 10.1 | 19.8 | 0.5 | -0.5 | 0.4 | |
| 07/30/2015 8:29 | 10.0 | 19.7 | 0.5 | -0.5 | 0.3 | |
| 07/30/2015 8:30 | 10.0 | 19.7 | 0.5 | -0.5 | 0.3 | |
| 07/30/2015 8:31 | 6.2 | 19.7 | 58.8 | 26.5 | 0.3 | |
| 07/30/2015 8:32 | 0.2 | 15.2 | 703.5 | 145.2 | 0.3 | |
| 07/30/2015 8:33 | 0.1 | 15.0 | 698.0 | 200.1 | 0.3 | |
| 07/30/2015 8:34 | 0.1 | 15.0 | 679.0 | 200.1 | 0.2 | |
| 07/30/2015 8:35 | 0.1 | 17.6 | 396.4 | 200.1 | 0.2 | |
| 07/30/2015 8:36 | 0.1 | 17.9 | 351.4 | 178.8 | 0.2 | |
| 07/30/2015 8:37 | 0.1 | 18.7 | 258.8 | 128.3 | 0.2 | |
| 07/30/2015 8:38 | 0.1 | 19.2 | 198.3 | 97.7 | 0.2 | |
| 07/30/2015 8:39 | 0.1 | 19.2 | 199.2 | 97.4 | 0.2 | |
| 07/30/2015 8:40 | 0.1 | 19.2 | 199.2 | 99.7 | 0.2 | |
| 07/30/2015 8:41 | 0.1 | 19.2 | 193.0 | 92.1 | 0.2 | |
| 07/30/2015 8:42 | 0.1 | 19.9 | 109.0 | 51.2 | 0.2 | |
| 07/30/2015 8:43 | 0.1 | 20.0 | 96.8 | 49.5 | 0.2 | |
| 07/30/2015 8:44 | 0.1 | 20.1 | 77.1 | 38.1 | 0.2 | |
| 07/30/2015 8:45 | 0.1 | 20.6 | 15.5 | 15.6 | 0.2 | |
| 07/30/2015 8:46 | 0.0 | 20.9 | 5.3 | 61.8 | 0.2 | |
| 07/30/2015 8:47 | 0.0 | 21.0 | 0.5 | 65.8 | 0.2 | |
| 07/30/2015 8:48 | 0.0 | 21.1 | 0.5 | 66.5 | 0.1 | NO2 conv eff. |
| 07/30/2015 8:49 | 0.0 | 21.1 | 0.5 | 66.6 | 0.2 | |
| 07/30/2015 8:50 | 0.1 | 21.0 | 0.5 | 29.9 | 0.1 | |
| 07/30/2015 8:51 | 0.1 | 20.8 | 0.9 | 0.3 | 0.7 | |
| 07/30/2015 8:52 | 0.0 | 5.0 | 2.2 | 0.0 | -0.5 | |
| 07/30/2015 8:53 | 0.0 | 0.1 | 0.5 | -0.1 | -0.5 | |
| 07/30/2015 8:54 | 0.0 | 0.1 | 0.5 | -0.2 | -0.4 | |
| 07/30/2015 8:55 | 0.0 | 0.5 | 0.5 | -0.2 | 0.2 | |
| 07/30/2015 8:56 | 0.0 | 9.7 | 1.1 | -0.1 | 0.4 | |
| 07/30/2015 8:57 | 0.0 | 10.4 | 1.1 | -0.1 | 0.7 | |
| 07/30/2015 8:58 | 0.0 | 10.8 | 1.0 | -0.2 | 0.9 | |
| 07/30/2015 8:59 | 6.6 | 18.5 | 0.5 | -0.2 | 1.0 | |
| 07/30/2015 9:00 | 9.9 | 19.6 | 0.5 | -0.2 | 1.0 | |
| 07/30/2015 9:01 | 10.0 | 19.6 | 0.5 | -0.1 | 1.5 | |
| 07/30/2015 9:02 | 4.4 | 17.5 | 238.5 | 128.9 | 1.6 | |
| 07/30/2015 9:03 | 0.1 | 17.4 | 405.1 | 175.6 | 1.4 | |
| 07/30/2015 9:04 | 0.1 | 17.9 | 350.7 | 172.0 | 1.5 | |
| 07/30/2015 9:05 | 0.3 | 17.8 | 334.6 | 164.3 | 2.9 | |
| 07/30/2015 9:06 | 1.4 | 18.3 | 135.6 | 59.0 | 2.1 | |
| 07/30/2015 9:07 | 0.1 | 20.0 | 96.9 | 49.7 | 1.9 | |
| 07/30/2015 9:08 | 0.1 | 20.0 | 96.3 | 50.1 | 7.5 | |
| 07/30/2015 9:09 | 1.4 | 19.1 | 50.9 | 22.1 | 67.7 | |
| 07/30/2015 9:10 | 0.1 | 20.9 | 2.2 | 0.4 | 49.6 | |
| 07/30/2015 9:11 | 0.1 | 20.9 | 1.5 | 0.1 | 47.8 | |
| 07/30/2015 9:12 | 0.1 | 20.9 | 1.1 | 0.1 | 50.3 | |
| 07/30/2015 9:13 | 0.1 | 20.9 | 1.1 | -0.1 | 50.4 | |
| 07/30/2015 9:14 | 0.1 | 20.9 | 1.1 | -0.1 | 28.3 | |

| | | | | | |
|---|---|---|---|---|---|
| 07/30/2015 9:15 | 0.1 | 20.9 | 1.1 | -0.1 | 29.5 |
| 07/30/2015 9:16 | 0.1 | 20.9 | 1.1 | -0.1 | 75.3 |
| 07/30/2015 9:17 | 0.1 | 20.9 | 1.1 | -0.1 | 68.2 |
| 07/30/2015 9:51 | 9.7 | 10.6 | 44.8 | 48.7 | 8.9 |
| 07/30/2015 9:52 | 9.9 | 10.3 | 40.5 | 47.1 | 8.3 |

| START RUN 1 | % CO2 | % O2 | ppm CO | ppm NOx | ppmw C3H8 |
|---|---|---|---|---|---|
| 07/30/2015 9:53 | 9.9 | 10.3 | 81.8 | 44.3 | 20.7 |
| 07/30/2015 9:54 | 9.9 | 10.4 | 84.9 | 45.8 | 10.1 |
| 07/30/2015 9:55 | 10.1 | 10.1 | 41.3 | 48.3 | 9.7 |
| 07/30/2015 9:56 | 10.1 | 10.2 | 43.2 | 47.6 | 21.7 |
| 07/30/2015 9:57 | 9.8 | 10.4 | 54.1 | 48.0 | 9.2 |
| 07/30/2015 9:58 | 9.9 | 10.4 | 35.9 | 47.4 | 8.1 |
| 07/30/2015 9:59 | 9.7 | 10.5 | 57.1 | 45.2 | 18.4 |
| 07/30/2015 10:00 | 9.4 | 10.8 | 90.8 | 44.4 | 11.0 |
| 07/30/2015 10:01 | 9.4 | 10.9 | 39.3 | 44.8 | 9.3 |
| 07/30/2015 10:02 | 9.5 | 10.8 | 36.3 | 44.6 | 9.9 |
| 07/30/2015 10:03 | 9.7 | 10.5 | 55.3 | 45.1 | 18.9 |
| 07/30/2015 10:04 | 9.8 | 10.4 | 33.4 | 46.5 | 8.0 |
| 07/30/2015 10:05 | 9.5 | 10.8 | 43.6 | 44.0 | 7.8 |
| 07/30/2015 10:06 | 9.3 | 11.0 | 96.5 | 39.4 | 19.4 |
| 07/30/2015 10:07 | 9.5 | 10.8 | 58.6 | 42.0 | 9.3 |
| 07/30/2015 10:08 | 9.5 | 10.7 | 34.0 | 44.7 | 9.1 |
| 07/30/2015 10:09 | 9.2 | 11.0 | 44.6 | 43.0 | 21.4 |
| 07/30/2015 10:10 | 7.7 | 12.6 | 35.1 | 32.1 | 7.6 |
| 07/30/2015 10:11 | 9.3 | 10.9 | 43.3 | 44.8 | 7.8 |
| 07/30/2015 10:12 | 9.7 | 10.6 | 104.0 | 43.7 | 20.0 |
| 07/30/2015 10:13 | 9.9 | 10.3 | 91.0 | 47.4 | 9.3 |
| 07/30/2015 10:14 | 9.9 | 10.4 | 46.4 | 46.6 | 8.9 |
| 07/30/2015 10:15 | 9.8 | 10.5 | 52.6 | 45.4 | 20.4 |
| 07/30/2015 10:16 | 9.8 | 10.4 | 60.7 | 46.7 | 8.4 |
| 07/30/2015 10:17 | 10.0 | 10.3 | 43.1 | 48.1 | 7.7 |
| 07/30/2015 10:18 | 10.0 | 10.3 | 78.2 | 45.6 | 19.1 |
| 07/30/2015 10:19 | 9.9 | 10.4 | 114.4 | 45.4 | 9.5 |
| 07/30/2015 10:20 | 10.0 | 10.2 | 50.3 | 47.0 | 9.0 |
| 07/30/2015 10:21 | 9.7 | 10.6 | 43.5 | 45.4 | 16.5 |
| 07/30/2015 10:22 | 9.5 | 10.7 | 57.1 | 45.1 | 15.8 |
| 07/30/2015 10:23 | 9.8 | 10.5 | 33.7 | 46.6 | 8.2 |
| 07/30/2015 10:24 | 9.9 | 10.4 | 48.6 | 45.5 | 8.2 |
| 07/30/2015 10:25 | 9.9 | 10.3 | 99.0 | 43.8 | 18.6 |
| 07/30/2015 10:26 | 9.0 | 11.3 | 46.4 | 42.8 | 8.3 |
| 07/30/2015 10:27 | 9.5 | 10.8 | 38.9 | 45.1 | 8.5 |
| 07/30/2015 10:28 | 9.4 | 10.9 | 57.6 | 45.1 | 19.8 |
| 07/30/2015 10:29 | 9.4 | 10.9 | 39.2 | 46.7 | 8.2 |
| 07/30/2015 10:30 | 9.5 | 10.8 | 40.1 | 45.5 | 7.9 |
| 07/30/2015 10:31 | 9.6 | 10.7 | 95.3 | 43.7 | 18.4 |
| 07/30/2015 10:32 | 9.9 | 10.4 | 85.1 | 47.3 | 8.9 |
| 07/30/2015 10:33 | 9.9 | 10.4 | 44.2 | 47.7 | 8.5 |
| 07/30/2015 10:34 | 9.6 | 10.7 | 49.1 | 45.8 | 20.8 |
| 07/30/2015 10:35 | 9.4 | 10.9 | 50.9 | 45.8 | 8.5 |
| 07/30/2015 10:36 | 9.5 | 10.8 | 37.8 | 46.2 | 7.8 |
| 07/30/2015 10:37 | 9.7 | 10.6 | 73.4 | 45.4 | 18.8 |
| 07/30/2015 10:38 | 9.9 | 10.4 | 106.0 | 45.5 | 9.2 |
| 07/30/2015 10:39 | 10.1 | 10.2 | 53.6 | 46.9 | 8.5 |
| 07/30/2015 10:40 | 10.1 | 10.1 | 53.1 | 46.0 | 18.9 |
| 07/30/2015 10:41 | 9.8 | 10.4 | 67.8 | 46.1 | 9.9 |
| 07/30/2015 10:42 | 9.9 | 10.3 | 38.7 | 47.4 | 7.9 |
| 07/30/2015 10:43 | 9.9 | 10.4 | 54.5 | 47.1 | 7.8 |
| 07/30/2015 10:44 | 9.1 | 11.1 | 92.9 | 38.4 | 17.3 |
| 07/30/2015 10:45 | 9.7 | 10.5 | 54.9 | 46.7 | 8.5 |
| 07/30/2015 10:46 | 9.6 | 10.7 | 47.3 | 44.9 | 8.5 |
| 07/30/2015 10:47 | 6.9 | 13.4 | 39.9 | 26.3 | 4.3 |
| 07/30/2015 10:48 | 6.6 | 14.0 | 25.0 | 40.7 | 7.7 |
| 07/30/2015 10:49 | 9.9 | 10.4 | 46.8 | 47.2 | 7.5 |
| 07/30/2015 10:50 | 10.0 | 10.3 | 98.0 | 45.3 | 18.1 |
| 07/30/2015 10:51 | 9.9 | 10.3 | 73.0 | 47.3 | 8.7 |
| 07/30/2015 10:52 | 9.8 | 10.5 | 42.5 | 46.8 | 8.3 |
| 07/30/2015 10:53 | 9.7 | 10.6 | 51.5 | 46.7 | 19.8 |
| 07/30/2015 10:54 | 9.5 | 10.7 | 48.6 | 47.8 | 8.2 |
| 07/30/2015 10:55 | 9.6 | 10.7 | 39.9 | 46.9 | 7.7 |
| 07/30/2015 10:56 | 10.0 | 10.3 | 81.5 | 46.3 | 18.7 |
| 07/30/2015 10:57 | 10.1 | 10.1 | 103.1 | 46.6 | 8.7 |

| | | | | | |
|---|---|---|---|---|---|
| 07/30/2015 10:58 | 10.2 | 10.0 | 49.7 | 48.4 | 8.1 |
| 07/30/2015 10:59 | 10.1 | 10.2 | 50.0 | 47.8 | 19.2 |
| 07/30/2015 11:00 | 9.8 | 10.5 | 63.7 | 47.7 | 9.0 |
| 07/30/2015 11:01 | 9.8 | 10.5 | 33.5 | 47.3 | 7.6 |
| 07/30/2015 11:02 | 9.8 | 10.5 | 46.6 | 45.2 | 14.3 |
| 07/30/2015 11:03 | 9.9 | 10.4 | 87.1 | 45.4 | 12.5 |
| AVG R 1 | 9.6 | 10.6 | 58.3 | 45.2 | 11.9 |
| 07/30/2015 11:04 | 9.9 | 10.4 | 49.1 | 47.9 | 7.9 |
| 07/30/2015 11:05 | 5.2 | 6.6 | 38.7 | 19.5 | 0.6 |
| 07/30/2015 11:06 | 0.1 | 0.1 | 1.4 | 1.0 | -0.8 |
| 07/30/2015 11:07 | 0.0 | 0.1 | 0.5 | 0.6 | -1.2 |
| 07/30/2015 11:08 | 0.1 | 2.9 | 1.3 | 1.2 | -1.0 |
| 07/30/2015 11:09 | 0.1 | 10.3 | 0.8 | 0.4 | -1.0 |
| 07/30/2015 11:10 | 0.0 | 10.4 | 0.5 | 0.3 | -1.0 |
| 07/30/2015 11:11 | 0.0 | 10.4 | 0.5 | 0.1 | -1.0 |
| 07/30/2015 11:12 | 0.0 | 10.4 | 0.5 | 0.1 | -0.9 |
| 07/30/2015 11:13 | 0.0 | 10.4 | 0.5 | 0.1 | 0.3 |
| 07/30/2015 11:14 | 3.7 | 12.2 | 7.1 | 12.5 | 0.2 |
| 07/30/2015 11:15 | 9.8 | 19.5 | 0.9 | 0.2 | -0.7 |
| 07/30/2015 11:16 | 10.0 | 19.6 | 0.5 | 0.1 | -0.7 |
| 07/30/2015 11:17 | 10.0 | 19.6 | 0.5 | 0.1 | -0.8 |
| 07/30/2015 11:18 | 9.8 | 18.4 | 9.6 | 8.1 | 2.0 |
| 07/30/2015 11:19 | 1.3 | 19.4 | 78.3 | 39.5 | -0.2 |
| 07/30/2015 11:20 | 0.1 | 20.0 | 95.2 | 44.8 | -0.2 |
| 07/30/2015 11:21 | 0.1 | 20.0 | 95.5 | 48.7 | -0.1 |
| 07/30/2015 11:22 | 0.1 | 20.0 | 95.3 | 45.1 | 1.7 |
| 07/30/2015 11:23 | 1.4 | 18.4 | 129.6 | 69.1 | 0.3 |
| 07/30/2015 11:24 | 0.1 | 19.4 | 172.3 | 80.0 | 0.3 |
| 07/30/2015 11:25 | 0.1 | 19.4 | 170.9 | 81.0 | 2.2 |
| 07/30/2015 11:26 | 2.2 | 18.1 | 66.0 | 27.9 | 16.3 |
| 07/30/2015 11:27 | 0.1 | 20.8 | 4.8 | 2.0 | 28.5 |
| 07/30/2015 11:28 | 0.1 | 20.8 | 2.4 | 2.2 | 18.8 |
| 07/30/2015 11:29 | 7.8 | 12.8 | 47.3 | 46.9 | 8.0 |

| START RUN 2 | % CO2 | % O2 | ppm CO | ppm NOx | ppmw C3H8 |
|---|---|---|---|---|---|
| 07/30/2015 11:30 | 10.3 | 10.0 | 52.6 | 50.4 | 7.9 |
| 07/30/2015 11:31 | 10.4 | 9.9 | 66.0 | 50.6 | 19.6 |
| 07/30/2015 11:32 | 10.4 | 10.0 | 50.7 | 52.6 | 8.0 |
| 07/30/2015 11:33 | 10.2 | 10.2 | 41.5 | 50.8 | 7.7 |
| 07/30/2015 11:34 | 10.1 | 10.2 | 78.0 | 48.0 | 19.4 |
| 07/30/2015 11:35 | 10.3 | 10.1 | 74.3 | 50.7 | 8.9 |
| 07/30/2015 11:36 | 10.5 | 9.8 | 40.5 | 51.3 | 8.5 |
| 07/30/2015 11:37 | 10.3 | 10.0 | 46.9 | 49.5 | 21.1 |
| 07/30/2015 11:38 | 10.1 | 10.3 | 54.4 | 48.5 | 8.9 |
| 07/30/2015 11:39 | 10.4 | 9.9 | 37.4 | 50.7 | 8.0 |
| 07/30/2015 11:40 | 10.6 | 9.7 | 69.1 | 49.2 | 18.8 |
| 07/30/2015 11:41 | 10.6 | 9.7 | 117.6 | 47.9 | 9.6 |
| 07/30/2015 11:42 | 10.6 | 9.8 | 57.7 | 49.4 | 8.6 |
| 07/30/2015 11:43 | 10.6 | 9.7 | 54.6 | 51.6 | 15.4 |
| 07/30/2015 11:44 | 10.7 | 9.6 | 75.2 | 51.8 | 12.5 |
| 07/30/2015 11:45 | 10.8 | 9.6 | 45.9 | 53.4 | 8.0 |
| 07/30/2015 11:46 | 10.8 | 9.5 | 66.6 | 50.2 | 8.1 |
| 07/30/2015 11:47 | 10.9 | 9.4 | 137.6 | 47.5 | 19.5 |
| 07/30/2015 11:48 | 10.9 | 9.4 | 80.2 | 50.7 | 8.7 |
| 07/30/2015 11:49 | 11.0 | 9.2 | 57.3 | 51.4 | 8.6 |
| 07/30/2015 11:50 | 10.9 | 9.3 | 77.2 | 49.4 | 20.2 |
| 07/30/2015 11:51 | 11.1 | 9.1 | 55.3 | 53.0 | 8.3 |
| 07/30/2015 11:52 | 11.3 | 8.9 | 54.0 | 51.8 | 8.1 |
| 07/30/2015 11:53 | 11.3 | 8.9 | 104.8 | 48.6 | 18.3 |
| 07/30/2015 11:54 | 11.2 | 9.0 | 90.7 | 49.8 | 9.2 |
| 07/30/2015 11:55 | 11.4 | 8.9 | 54.2 | 49.0 | 8.8 |
| 07/30/2015 11:56 | 11.3 | 9.0 | 61.7 | 47.2 | 21.9 |
| 07/30/2015 11:57 | 11.1 | 9.1 | 61.4 | 46.8 | 8.9 |
| 07/30/2015 11:58 | 11.1 | 9.2 | 43.0 | 46.6 | 8.3 |
| 07/30/2015 11:59 | 11.2 | 9.1 | 78.6 | 45.1 | 20.6 |
| 07/30/2015 12:00 | 11.4 | 8.9 | 107.3 | 46.9 | 9.5 |
| 07/30/2015 12:01 | 11.2 | 9.1 | 52.2 | 46.8 | 8.9 |
| 07/30/2015 12:02 | 11.3 | 9.0 | 57.3 | 47.0 | 19.3 |
| 07/30/2015 12:03 | 11.5 | 8.9 | 76.2 | 48.9 | 9.8 |
| 07/30/2015 12:04 | 11.4 | 8.9 | 50.3 | 48.8 | 8.0 |
| 07/30/2015 12:05 | 11.3 | 9.0 | 80.7 | 46.8 | 8.5 |
| 07/30/2015 12:06 | 11.1 | 9.2 | 149.8 | 45.7 | 18.7 |

| | | | | | |
|---|---|---|---|---|---|
| 07/30/2015 12:07 | 11.0 | 9.3 | 80.0 | 47.7 | 8.7 |
| 07/30/2015 12:08 | 11.1 | 9.2 | 60.2 | 48.4 | 8.7 |
| 07/30/2015 12:09 | 11.1 | 9.2 | 80.3 | 47.9 | 20.3 |
| 07/30/2015 12:10 | 11.2 | 9.1 | 53.8 | 50.2 | 8.2 |
| 07/30/2015 12:11 | 11.4 | 8.9 | 60.5 | 47.4 | 7.9 |
| 07/30/2015 12:12 | 11.1 | 9.2 | 119.7 | 43.7 | 19.6 |
| 07/30/2015 12:13 | 11.1 | 9.2 | 90.3 | 46.7 | 8.9 |
| 07/30/2015 12:14 | 11.5 | 8.8 | 60.0 | 48.6 | 8.7 |
| 07/30/2015 12:15 | 11.6 | 8.7 | 73.9 | 47.4 | 10.7 |
| 07/30/2015 12:16 | 10.2 | 10.1 | 53.8 | 46.0 | 7.8 |
| 07/30/2015 12:17 | 11.0 | 9.2 | 47.7 | 46.0 | 7.6 |
| 07/30/2015 12:18 | 11.0 | 9.3 | 81.3 | 43.1 | 20.2 |
| 07/30/2015 12:19 | 11.1 | 9.2 | 100.4 | 42.8 | 9.3 |
| 07/30/2015 12:20 | 11.1 | 9.1 | 49.0 | 44.0 | 8.7 |
| 07/30/2015 12:21 | 10.9 | 9.4 | 55.0 | 43.1 | 19.3 |
| 07/30/2015 12:22 | 10.9 | 9.4 | 71.1 | 44.2 | 8.6 |
| 07/30/2015 12:23 | 10.9 | 9.4 | 46.3 | 43.3 | 7.6 |
| 07/30/2015 12:24 | 10.8 | 9.4 | 81.3 | 40.8 | 15.1 |
| 07/30/2015 12:25 | 10.9 | 9.4 | 142.4 | 41.1 | 11.3 |
| 07/30/2015 12:26 | 11.2 | 9.1 | 69.8 | 44.7 | 8.6 |
| 07/30/2015 12:27 | 11.3 | 9.0 | 61.0 | 44.4 | 8.9 |
| 07/30/2015 12:28 | 11.2 | 9.1 | 83.8 | 45.0 | 19.1 |
| 07/30/2015 12:29 | 11.1 | 9.2 | 55.0 | 46.3 | 7.6 |
| 07/30/2015 12:30 | 11.0 | 9.3 | 69.9 | 45.2 | 7.6 |
| 07/30/2015 12:31 | 11.2 | 9.1 | 140.7 | 44.3 | 18.8 |
| 07/30/2015 12:32 | 11.5 | 8.8 | 91.3 | 48.8 | 8.7 |
| 07/30/2015 12:33 | 11.6 | 8.7 | 60.0 | 49.8 | 8.4 |
| 07/30/2015 12:34 | 11.0 | 9.4 | 71.3 | 47.2 | 20.7 |
| 07/30/2015 12:35 | 11.6 | 8.7 | 67.7 | 48.3 | 7.9 |
| 07/30/2015 12:36 | 11.4 | 8.9 | 55.9 | 45.4 | 7.5 |
| 07/30/2015 12:37 | 10.8 | 9.4 | 91.3 | 41.5 | 18.7 |
| 07/30/2015 12:38 | 10.4 | 9.9 | 92.0 | 40.8 | 9.3 |
| 07/30/2015 12:39 | 10.9 | 9.4 | 47.3 | 43.6 | 8.8 |
| 07/30/2015 12:40 | 11.2 | 9.1 | 54.9 | 44.0 | 20.5 |
| 07/30/2015 12:41 | 11.1 | 9.2 | 68.5 | 45.0 | 8.2 |
| 07/30/2015 12:42 | 11.0 | 9.2 | 48.1 | 45.4 | 7.4 |
| 07/30/2015 12:43 | 11.3 | 9.0 | 79.1 | 45.9 | 17.7 |
| 07/30/2015 12:44 | 11.2 | 9.1 | 128.4 | 44.7 | 10.0 |
| 07/30/2015 12:45 | 10.9 | 9.3 | 53.4 | 46.6 | 8.6 |
| 07/30/2015 12:46 | 10.5 | 9.8 | 46.6 | 44.4 | 9.0 |
| 07/30/2015 12:47 | 10.6 | 9.7 | 68.3 | 45.3 | 19.8 |
| 07/30/2015 12:48 | 11.0 | 9.3 | 50.1 | 47.7 | 7.4 |
| 07/30/2015 12:49 | 11.2 | 9.1 | 71.5 | 47.4 | 7.4 |
| AVG R 2 | 11.0 | 9.3 | 71.1 | 47.2 | 11.8 |
| 07/30/2015 12:50 | 11.2 | 9.1 | 143.7 | 45.4 | 21.9 |
| 07/30/2015 12:51 | 5.8 | 6.3 | 47.2 | 16.3 | 1.0 |
| 07/30/2015 12:52 | 0.1 | 0.1 | 0.7 | 1.3 | -0.5 |
| 07/30/2015 12:53 | 0.0 | 0.1 | 0.5 | 0.9 | -0.8 |
| 07/30/2015 12:54 | 0.0 | 0.0 | 0.5 | 0.6 | -0.4 |
| 07/30/2015 12:55 | 0.1 | 5.7 | 0.7 | 0.5 | -0.7 |
| 07/30/2015 12:56 | 0.0 | 10.3 | 0.4 | 0.4 | -0.7 |
| 07/30/2015 12:57 | 0.0 | 10.4 | 0.5 | 0.2 | -0.8 |
| 07/30/2015 12:58 | 0.0 | 10.4 | 0.5 | 0.2 | -0.8 |
| 07/30/2015 12:59 | 0.3 | 10.4 | 2.8 | 1.7 | 1.7 |
| 07/30/2015 13:00 | 7.8 | 16.3 | 7.2 | 4.5 | -0.3 |
| 07/30/2015 13:01 | 10.0 | 19.6 | 0.5 | 0.2 | -0.2 |
| 07/30/2015 13:02 | 8.5 | 18.7 | 30.7 | 19.8 | 3.1 |
| 07/30/2015 13:03 | 0.4 | 19.2 | 162.0 | 78.8 | -0.2 |
| 07/30/2015 13:04 | 0.1 | 19.3 | 170.7 | 77.0 | -0.3 |
| 07/30/2015 13:05 | 0.1 | 19.3 | 172.6 | 79.0 | -0.1 |
| 07/30/2015 13:06 | 0.1 | 19.3 | 172.5 | 87.1 | 1.0 |
| 07/30/2015 13:07 | 1.1 | 18.8 | 112.6 | 57.2 | 0.0 |
| 07/30/2015 13:08 | 0.1 | 20.0 | 97.4 | 51.6 | 0.0 |
| 07/30/2015 13:09 | 0.1 | 20.0 | 97.2 | 51.7 | 1.2 |
| 07/30/2015 13:10 | 1.4 | 19.0 | 58.1 | 32.7 | 12.5 |
| 07/30/2015 13:11 | 0.1 | 20.7 | 6.2 | 2.9 | 27.7 |
| 07/30/2015 13:12 | 0.1 | 20.8 | 1.3 | 1.0 | 27.9 |
| 07/30/2015 13:13 | 0.1 | 20.8 | 1.1 | 0.7 | 22.4 |
| 07/30/2015 13:14 | 5.6 | 15.1 | 30.4 | 36.1 | 7.6 |
| START RUN 3 | % CO2 | % O2 | ppm CO | ppm NOx | ppmw C3H8 |
| 07/30/2015 13:15 | 10.5 | 9.8 | 104.4 | 49.2 | 17.1 |

| | | | | | |
|---|---|---|---|---|---|
| 07/30/2015 13:16 | 10.9 | 9.4 | 81.6 | 53.6 | 9.0 |
| 07/30/2015 13:17 | 11.3 | 9.0 | 46.4 | 55.1 | 8.8 |
| 07/30/2015 13:18 | 11.1 | 9.1 | 58.2 | 53.2 | 17.4 |
| 07/30/2015 13:19 | 10.7 | 9.6 | 63.7 | 52.6 | 8.2 |
| 07/30/2015 13:20 | 10.5 | 9.8 | 45.4 | 53.1 | 7.7 |
| 07/30/2015 13:21 | 10.4 | 9.9 | 77.9 | 51.3 | 18.2 |
| 07/30/2015 13:22 | 10.5 | 9.8 | 101.9 | 51.5 | 9.6 |
| 07/30/2015 13:23 | 10.7 | 9.5 | 49.8 | 53.6 | 9.0 |
| 07/30/2015 13:24 | 11.0 | 9.3 | 52.5 | 55.1 | 18.1 |
| 07/30/2015 13:25 | 11.1 | 9.2 | 75.3 | 54.8 | 9.2 |
| 07/30/2015 13:26 | 11.3 | 8.9 | 48.1 | 57.6 | 7.8 |
| 07/30/2015 13:27 | 11.1 | 9.2 | 70.8 | 53.5 | 8.2 |
| 07/30/2015 13:28 | 10.7 | 9.6 | 128.2 | 50.7 | 19.4 |
| 07/30/2015 13:29 | 10.5 | 9.8 | 60.4 | 52.9 | 9.0 |
| 07/30/2015 13:30 | 10.5 | 9.8 | 48.1 | 53.6 | 9.1 |
| 07/30/2015 13:31 | 10.6 | 9.7 | 69.4 | 53.2 | 17.8 |
| 07/30/2015 13:32 | 9.2 | 11.1 | 45.8 | 48.0 | 7.7 |
| 07/30/2015 13:33 | 10.2 | 10.1 | 58.9 | 55.6 | 7.4 |
| 07/30/2015 13:34 | 10.2 | 10.1 | 117.0 | 53.4 | 17.4 |
| 07/30/2015 13:35 | 10.2 | 10.0 | 82.1 | 56.2 | 8.6 |
| 07/30/2015 13:36 | 10.2 | 10.1 | 49.6 | 56.7 | 8.3 |
| 07/30/2015 13:37 | 10.1 | 10.2 | 62.1 | 54.3 | 17.7 |
| 07/30/2015 13:38 | 10.2 | 10.0 | 60.7 | 54.4 | 8.0 |
| 07/30/2015 13:39 | 10.7 | 9.5 | 45.3 | 56.2 | 7.7 |
| 07/30/2015 13:40 | 10.6 | 9.6 | 78.3 | 53.7 | 18.5 |
| 07/30/2015 13:41 | 10.5 | 9.7 | 92.0 | 53.8 | 9.0 |
| 07/30/2015 13:42 | 10.5 | 9.7 | 43.9 | 52.9 | 8.8 |
| 07/30/2015 13:43 | 10.3 | 10.0 | 46.8 | 50.5 | 19.3 |
| 07/30/2015 13:44 | 10.1 | 10.2 | 60.0 | 50.6 | 8.7 |
| 07/30/2015 13:45 | 10.2 | 10.0 | 40.4 | 52.2 | 7.7 |
| 07/30/2015 13:46 | 10.3 | 9.9 | 67.7 | 50.7 | 15.9 |
| 07/30/2015 13:47 | 9.9 | 10.4 | 118.6 | 49.3 | 10.4 |
| 07/30/2015 13:48 | 9.7 | 10.6 | 54.4 | 51.7 | 8.3 |
| 07/30/2015 13:49 | 9.6 | 10.7 | 46.8 | 51.1 | 8.4 |
| 07/30/2015 13:50 | 9.8 | 10.5 | 67.6 | 52.8 | 17.2 |
| 07/30/2015 13:51 | 10.0 | 10.3 | 44.9 | 54.3 | 7.3 |
| 07/30/2015 13:52 | 10.0 | 10.2 | 55.0 | 53.0 | 7.3 |
| 07/30/2015 13:53 | 9.8 | 10.5 | 110.7 | 49.2 | 18.4 |
| 07/30/2015 13:54 | 9.6 | 10.7 | 70.8 | 50.9 | 8.6 |
| 07/30/2015 13:55 | 9.7 | 10.6 | 51.6 | 50.4 | 8.5 |
| 07/30/2015 13:56 | 10.0 | 10.2 | 70.9 | 51.2 | 19.2 |
| 07/30/2015 13:57 | 10.2 | 10.1 | 61.8 | 51.8 | 7.5 |
| 07/30/2015 13:58 | 10.1 | 10.1 | 57.4 | 50.3 | 7.3 |
| 07/30/2015 13:59 | 10.3 | 9.9 | 111.5 | 48.3 | 18.6 |
| 07/30/2015 14:00 | 10.4 | 9.9 | 110.0 | 50.5 | 8.9 |
| 07/30/2015 14:01 | 10.5 | 9.7 | 49.2 | 50.9 | 8.5 |
| 07/30/2015 14:02 | 10.2 | 10.0 | 47.1 | 48.3 | 20.4 |
| 07/30/2015 14:03 | 10.0 | 10.2 | 56.3 | 49.7 | 8.1 |
| 07/30/2015 14:04 | 10.2 | 10.0 | 40.6 | 49.3 | 7.5 |
| 07/30/2015 14:05 | 10.2 | 10.0 | 68.7 | 45.9 | 16.1 |
| 07/30/2015 14:06 | 9.5 | 10.8 | 99.5 | 44.7 | 9.6 |
| 07/30/2015 14:07 | 10.0 | 10.3 | 51.2 | 49.1 | 8.4 |
| 07/30/2015 14:08 | 10.2 | 10.2 | 49.1 | 49.1 | 13.1 |
| 07/30/2015 14:09 | 10.2 | 10.0 | 68.7 | 48.2 | 15.1 |
| 07/30/2015 14:10 | 10.1 | 10.2 | 43.9 | 47.5 | 7.7 |
| 07/30/2015 14:11 | 10.3 | 10.0 | 58.7 | 48.1 | 7.9 |
| 07/30/2015 14:12 | 10.4 | 9.8 | 124.5 | 45.7 | 19.7 |
| 07/30/2015 14:13 | 10.4 | 9.8 | 75.0 | 47.5 | 8.6 |
| 07/30/2015 14:14 | 10.4 | 9.9 | 53.5 | 47.2 | 8.5 |
| AVG R 3 | 10.3 | 10.0 | 67.5 | 51.5 | 11.5 |
| 07/30/2015 14:15 | 10.3 | 9.9 | 71.8 | 47.1 | 20.6 |
| 07/30/2015 14:16 | 10.1 | 10.2 | 56.6 | 49.1 | 7.7 |
| 07/30/2015 14:17 | 9.8 | 10.5 | 55.8 | 49.9 | 7.2 |
| 07/30/2015 14:18 | 9.6 | 10.7 | 117.8 | 49.5 | 16.4 |
| 07/30/2015 14:19 | 9.3 | 10.9 | 107.2 | 51.2 | 8.0 |
| 07/30/2015 14:20 | 8.9 | 11.3 | 57.8 | 51.5 | 7.4 |
| 07/30/2015 14:21 | 8.6 | 11.7 | 57.8 | 48.1 | 13.6 |
| 07/30/2015 14:22 | 2.0 | 4.1 | 16.2 | 6.8 | 0.1 |
| 07/30/2015 14:23 | 0.0 | 0.1 | 0.5 | 1.1 | -0.6 |
| 07/30/2015 14:24 | 0.0 | 0.1 | 0.5 | 0.8 | -0.7 |
| 07/30/2015 14:25 | 0.0 | 4.6 | 0.5 | 0.6 | -0.6 |

| | | | | | |
|---|---|---|---|---|---|
| 07/30/2015 14:26 | 0.0 | 10.3 | 0.5 | 0.5 | -0.6 |
| 07/30/2015 14:27 | 0.0 | 10.4 | 0.5 | 0.3 | -0.6 |
| 07/30/2015 14:28 | 0.0 | 10.4 | 0.5 | 0.3 | -0.6 |
| 07/30/2015 14:29 | 0.0 | 10.9 | 0.4 | 0.3 | -0.5 |
| 07/30/2015 14:30 | 7.1 | 18.5 | 0.3 | 0.3 | -0.6 |
| 07/30/2015 14:31 | 10.0 | 19.6 | -0.2 | 0.3 | -0.5 |
| 07/30/2015 14:32 | 10.0 | 19.6 | -0.2 | 0.3 | -0.5 |
| 07/30/2015 14:33 | 10.0 | 19.6 | -0.2 | 0.3 | -0.5 |
| 07/30/2015 14:34 | 6.9 | 19.7 | 27.1 | 25.7 | 1.3 |
| 07/30/2015 14:35 | 0.2 | 19.3 | 165.8 | 89.5 | -0.2 |
| 07/30/2015 14:36 | 0.1 | 19.3 | 173.9 | 88.6 | -0.2 |
| 07/30/2015 14:37 | 0.1 | 19.3 | 174.4 | 89.3 | -0.2 |
| 07/30/2015 14:38 | 0.1 | 19.3 | 174.3 | 90.2 | -0.2 |
| 07/30/2015 14:39 | 0.1 | 19.4 | 151.8 | 77.1 | -0.3 |
| 07/30/2015 14:40 | 0.1 | 19.9 | 96.1 | 52.3 | -0.3 |
| 07/30/2015 14:41 | 0.1 | 19.9 | 97.1 | 52.3 | -0.3 |
| 07/30/2015 14:42 | 0.1 | 19.9 | 90.9 | 47.9 | -0.3 |
| 07/30/2015 14:43 | 0.1 | 20.6 | 22.6 | 8.0 | 22.0 |
| 07/30/2015 14:44 | 0.1 | 20.8 | 2.9 | 1.3 | 28.8 |
| 07/30/2015 14:45 | 0.1 | 20.8 | 1.2 | 0.8 | 29.5 |

# *APPENDIX D*

# *CONDENSABLE PM ANALYSIS*

# *ENTHALPY*

# Environmental Monitoring Labs

624 Ridgewood Rd.
Ridgeland, MS 39158

## Westervelt RE

Aliceville, AL

## Analytical Report
## (0815-57)

## *EPA Method 202*

Condensable Particulate Matter


**Enthalpy Analytical, Inc.**

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com

800-1 Capitola Drive Durham, NC 27713-4385

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 15 pages.

QA Review Performed by: Michael Steven Schapira

Report Issued: 8/19/15

# Summary of Results

## Enthalpy Analytical

Company: Environmental Monitoring Labs

Client No.: Westervelt RE: Aliceville, AL

Job No.: 0815-57

Parameters: 1. EPA Method 202 Analysis

Samples: 6 Runs, 3 Blanks, and 1 Train Blank

Analyst: khoffman

## Summary Report

| | RTO1-Run 1 | RTO1-Run 2 | RTO1-Run 3 |
|---|---|---|---|
| Net Organic Catch (mg) | 4.8 | 4.6 | 4.9 |
| Corrected Inorganic (mg) | 6.9 | 10.4 | 6.9 |
| CPM (mg) | 11.6 | 15.0 | 11.8 |
| TB Corrected CPM (mg) | 9.6 | 13.0 | 9.8 |

| | RTO2-Run 1 | RTO2-Run 2 | RTO2-Run 3 |
|---|---|---|---|
| Net Organic Catch (mg) | 3.7 | 3.7 | 3.5 |
| Corrected Inorganic (mg) | 3.4 | 3.2 | 2.4 |
| CPM (mg) | 7.1 | 6.9 | 6.0 |
| TB Corrected CPM (mg) | 5.1 | 4.9 | 4.0 |

| | Train Blank |
|---|---|
| Net Organic Catch (mg) | 3.0 |
| Corrected Inorganic (mg) | 1.6 |
| CPM (mg) | 4.6 |

# Results

## Enthalpy Analytical

Company: Environmental Monitoring Labs
Client No.: Westervelt RE: Aliceville, AL
Job No.: 0815-57

Parameters: 1. EPA Method 202 Analysis
Samples: 6 Runs, 3 Blanks, and 1 Train Blank
Analyst: khoffman

## Results

| | RTO1-Run 1 | | RTO1-Run 2 | | RTO1-Run 3 | | Train Blank | |
|---|---|---|---|---|---|---|---|---|
| Beaker Number | 8338 | | 8339 | | 8340 | | 8344 | |
| Initial Solvent Volume (mL) | 154 | | 158 | | 170 | | 126 | |
| Org Final Weight 1 (g) | 2.713284 | 08/14/15 10:04 | 2.686496 | 08/14/15 10:05 | 2.708538 | 08/14/15 10:06 | 2.693710 | 08/14/15 10:08 |
| Org Final Weight 2 (g) | 2.713194 | 08/14/15 16:13 | 2.686555 | 08/14/15 16:13 | 2.708660 | 08/14/15 16:13 | 2.693806 | 08/14/15 16:15 |
| Tare (g) | 2.708426 | 08/04/15 16:22 | 2.681928 | 08/04/15 16:22 | 2.703731 | 08/04/15 16:23 | 2.690792 | 08/04/15 16:24 |
| Organic Catch (mg) | 4.77 | | 4.63 | | 4.93 | | 3.01 | |
| | | | | | | | | |
| Inorganic | | | | | | | | |
| Beaker Number | 8432 | | 8433 | | 8434 | | 8438 | |
| Weight 1 (g) | 2.653108 | 08/14/15 9:59 | 2.668967 | 08/17/15 9:01 | 2.685902 | 08/14/15 10:00 | 2.716276 | 08/14/15 10:02 |
| Weight 2 (g) | 2.653208 | 08/14/15 16:07 | 2.668820 | 08/17/15 15:03 | 2.686093 | 08/14/15 16:08 | 2.716397 | 08/14/15 16:10 |
| Tare (g) | 2.646375 | 08/10/15 17:00 | 2.658522 | 08/10/15 17:00 | 2.679238 | 08/10/15 17:01 | 2.714839 | 08/10/15 17:02 |
| Initial Water Vol (mL) | 840 | | 912 | | 838 | | 204 | |
| Water Added by Lab (mL) | 75 | | 75 | | 75 | | 75 | |
| Aliq 1 Removed (mL) | 0.5 | | 0.5 | | 0.5 | | 0.5 | |
| Resuspend Vol (mL) | 100 | | 100 | | 100 | | 100 | |
| Aliq 2 Removed (mL) | 0.5 | | 0.5 | | 0.5 | | 0.5 | |
| Net Inorganic Catch (mg) | 6.87 | | 10.35 | | 6.89 | | 1.57 | |
| Titrant Normality | 0.10 | | 0.10 | | 0.10 | | 0.10 | |
| Titrant Vol (mL) | 0.08 | | 0.07 | | 0.07 | | 0.04 | |
| Titrant Blank Vol (mL) | 0.05 | | 0.05 | | 0.05 | | 0.05 | |
| Ammonium Corr (mg) | 0.00 | | 0.00 | | 0.00 | | 0.00 | |
| Corrected Inorganic (mg) | 6.87 | | 10.35 | | 6.89 | | 1.57 | |
| | | | | | | | | |
| Condensible Particulate (mg) | 11.64 | | 14.98 | | 11.82 | | 4.58 | |
| TB Corrected CPM (mg) | 9.64 | | 12.98 | | 9.82 | | | |

## Enthalpy Analytical

Company: Environmental Monitoring Labs
Client No.: Westervelt RE: Aliceville, AL
Job No.: 0815-57

Parameters: 1. EPA Method 202 Analysis
Samples: 6 Runs, 3 Blanks, and 1 Train Blank
Analyst: khoffman

## Results

| | RTO2-Run 1 | RTO2-Run 2 | RTO2-Run 3 | Train Blank |
|---|---|---|---|---|
| Beaker Number | 8341 | 8342 | 8343 | 8344 |
| Initial Solvent Volume (mL) | 174 | 146 | 154 | 126 |
| Org Final Weight 1 (g) | 2.733222 08/14/15 10:06 | 2.695139 08/14/15 10:07 | 2.719985 08/14/15 10:07 | 2.693710 08/14/15 10:08 |
| Org Final Weight 2 (g) | 2.733273 08/14/15 16:14 | 2.695216 08/14/15 16:14 | 2.720061 08/14/15 16:15 | 2.693806 08/14/15 16:15 |
| Tare (g) | 2.729546 08/04/15 16:23 | 2.691498 08/04/15 16:24 | 2.716512 08/04/15 16:24 | 2.690792 08/04/15 16:24 |
| Organic Catch (mg) | 3.73 | 3.72 | 3.55 | 3.01 |
| | | | | |
| Inorganic | | | | |
| Beaker Number | 8435 | 8436 | 8437 | 8438 |
| Weight 1 (g) | 2.668614 08/14/15 10:01 | 2.678969 08/14/15 10:01 | 2.649258 08/14/15 10:02 | 2.716276 08/14/15 10:02 |
| Weight 2 (g) | 2.668729 08/14/15 16:09 | 2.679149 08/14/15 16:09 | 2.649356 08/14/15 16:09 | 2.716397 08/14/15 16:10 |
| Tare (g) | 2.665367 08/10/15 17:01 | 2.675991 08/10/15 17:01 | 2.646960 08/10/15 17:02 | 2.714839 08/10/15 17:02 |
| Initial Water Vol (mL) | 200 | 194 | 192 | 204 |
| Water Added by Lab (mL) | 75 | 75 | 75 | 75 |
| Aliq 1 Removed (mL) | 0.5 | 0.5 | 0.5 | 0.5 |
| Resuspend Vol (mL) | 100 | 100 | 100 | 100 |
| Aliq 2 Removed (mL) | 0.5 | 0.5 | 0.5 | 0.5 |
| Net Inorganic Catch (mg) | 3.39 | 3.18 | 2.41 | 1.57 |
| Titrant Normality | 0.10 | 0.10 | 0.10 | 0.10 |
| Titrant Vol (mL) | 0.05 | 0.07 | 0.07 | 0.04 |
| Titrant Blank Vol (mL) | 0.05 | 0.05 | 0.05 | 0.05 |
| Ammonium Corr (mg) | 0.00 | 0.00 | 0.00 | 0.00 |
| Corrected Inorganic (mg) | 3.39 | 3.18 | 2.41 | 1.57 |
| | | | | |
| Condensible Particulate (mg) | 7.11 | 6.90 | 5.96 | 4.58 |
| TB Corrected CPM (mg) | 5.11 | 4.90 | 3.96 | |

## Enthalpy Analytical

Company: Environmental Monitoring Labs

Client No.: Westervelt RE: Aliceville, AL

Job No.: 0815-57

Parameters: 1. EPA Method 202 Analysis

Samples: 6 Runs, 3 Blanks, and 1 Train Blank

Analyst: khoffman

## Reagent Blanks

| | | Hexane | | Acetone | | Water | |
|---|---|---|---|---|---|---|---|
| In House | Beaker | 8346 | | 8348 | | 8440 | |
| | Weight 1 (g) | 2.714094 | 08/14/15 10:09 | 2.719483 | 08/14/15 10:10 | 2.695493 | 08/14/15 10:03 |
| | Weight 2 (g) | 2.714138 | 08/14/15 16:16 | 2.719511 | 08/14/15 16:17 | 2.695602 | 08/14/15 16:11 |
| | Tare (g) | 2.714223 | 08/04/15 16:25 | 2.719652 | 08/04/15 16:26 | 2.694166 | 08/10/15 17:03 |
| | Residue (g) | -0.0001 | | -0.0001 | | 0.0014 | |
| | Vol (mL) | 225 | | 200 | | 250 | |
| | Max Residue (g) | 0.0001 | | 0.0002 | | 0.0003 | |
| | | Hexane | | Acetone | | Water | |
| Client's | Beaker | 8345 | | 8347 | | 8439 | |
| | Weight 1 (g) | 2.713225 | 08/14/15 10:08 | 2.731491 | 08/14/15 10:09 | 2.685638 | 08/14/15 10:03 |
| | Weight 2 (g) | 2.713247 | 08/14/15 16:15 | 2.731532 | 08/14/15 16:16 | 2.685764 | 08/14/15 16:11 |
| | Tare (g) | 2.712652 | 08/04/15 16:25 | 2.731405 | 08/04/15 16:26 | 2.683419 | 08/10/15 17:03 |
| | Residue (g) | 0.0006 | | 0.0001 | | 0.0023 | |
| | Vol (mL) | 100 | | 102 | | 100 | |
| | Max Residue (g) | 0.0001 | | 0.0001 | | 0.0001 | |

# Narrative Summary

# Enthalpy Analytical Narrative Summary

| | |
|---|---|
| **Company** | Env. Monitoring Labs |
| **Analyst** | KTH / JMM |
| **Parameters** | EPA Method 202 |

| | |
|---|---|
| **Client #** | Westervelt RE |
| **Job #** | 0815-57 |
| **# Samples** | 6, 3 Rgnt Blks, 1 Train Blank |

**Custody**

Summer Mims received the samples on 8/5/15 after being relinquished by Environmental Monitoring Labs. The samples were received at 26.4 °C and in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

**Analysis**

The samples were analyzed for condensable particulate matter using the analytical procedures in EPA Method 202, Determination of Condensible Particulate Emissions from Stationary Sources (40 CFR Part 51, Appendix M).

All samples were weighed on Balance 8 (Sartorius Model ME 5-F, Serial # 23104965), certified by Mettler Toledo through July 31, 2016.

**QC Notes**

A field (train) blank was received and analyzed with these samples. The method specifies that blank corrections are accomplished by subtracting the particulate mass determined for the 'Field Train Blank' or 2 mg (whichever is less) from the sample weight.

Reagent blanks were received with these samples. Laboratory Reagent Blanks were also dried down with the samples. All these reagent blanks are reported, though no blank corrections were made using their results.

The inorganic results for the samples were corrected for the ammonium ions used to precipitate the sulfate, per the formula in the method (Section 12.2.1).

**Reporting Notes**

Gravimetric analyses are considered to be accurate to ±0.5 mg. Therefore, negative catch weights between 0 and –0.5 mg are not investigated. Negative catch weights less than -0.5 mg are investigated. There were no sample fractions with negative catch weights less than -0.5 mg for this set of Method 202 samples.

These analyses met the requirements of the TNI Standard. Any deviations from the requirements of the reference method or TNI Standard have been stated above.

The results presented in this report are representative of the samples as provided to the laboratory.

# General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- Any analysis which refers to the method as ***"Type"*** represents a planned deviation from the reference method. For instance a Hydrogen Sulfide assay from a Tedlar bag would be labeled as "EPA Method 16-Type" because Tedlar bags are not mentioned as one of the collection options in EPA Method 16.
- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** in the Qualifier or Flag column in the results indicates that the value is between the MDL and the LOQ. The laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** in the Qualifier or Flag column indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. The MS analysis indicates what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as a MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.

# General Reporting Notes

**(continued)**

- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two spikes are retained as LCSs. The LCSs are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.
- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations on sample chromatograms, if provided in the report. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name on the chromatogram.

# Sample Custody

Copy 1 of 2

CHAIN OF CUSTODY AND REQUEST FOR ANALYSIS



| | |
|---|---|
| ENVIRONMENTAL MONITORING LABORATORIES<br>POST OFFICE BOX 655<br>RIDGELAND, MISSISSIPPI 39158<br><br>PHONE: 601/856-3092<br>FAX: 601/853-2151 Attention: Danny Russell | Laboratory:<br>Enthalpy Analytical, Inc.<br>2202 Ellis Road<br>Durham, NC 27703-5518<br>PHONE: 919/850-4392<br>Attention: Bryan Tyler |

Project: Westervelt RE -- Aliceville, AL

Nos. 1 and 2 RTO's for total PM on July 29 and 30, 2015

TAT: Routine

ANALYSES REQUESTED: gravimetric as per Method 202

| No. of containers | DG | SAMPLE ID | | | gravimetric as per Method 202 | | | | UNITS |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | RTO 1 CPM C1 R1 | | Condensate Plus Water Rinse | x | | | | milligrams |
| 1 | | RTO 1 CPM C1 R2 | | Condensate Plus Water Rinse | x | | | | |
| 1 | | RTO 1 CPM C1 R3 | | Condensate Plus Water Rinse | x | | | | |
| 1 | * | RTO 1 CPM C2 R1 | | Acetone/Hexane Rinse | x | | | | |
| 1 | * | RTO 1 CPM C2 R2 | | Acetone/Hexane Rinse | x | | | | |
| 1 | * | RTO 1 CPM C2 R3 | | Acetone/Hexane Rinse | x | | | | |
| 1 | | RTO 1 CPM C3 R1 | | CPM Hexane Treated Filter | x | | | | |
| 1 | | RTO 1 CPM C3 R2 | | CPM Hexane Treated Filter | x | | | | |
| 1 | | RTO 1 CPM C3 R3 | | CPM Hexane Treated Filter | x | | | | |
| 1 | | RTO 2 CPM C1 R1 | | Condensate Plus Water Rinse | x | | | | |
| 1 | | RTO 2 CPM C1 R2 | | Condensate Plus Water Rinse | x | | | | |
| 1 | | RTO 2 CPM C1 R3 | | Condensate Plus Water Rinse | x | | | | |
| 1 | * | RTO 2 CPM C2 R1 | | Acetone/Hexane Rinse | x | | | | |
| 1 | * | RTO 2 CPM C2 R2 | | Acetone/Hexane Rinse | x | | | | |
| 1 | * | RTO 2 CPM C2 R3 | | Acetone/Hexane Rinse | x | | | | |
| 1 | | RTO 2 CPM C3 R1 | | CPM Hexane Treated Filter | x | | | | |
| 1 | | RTO 2 CPM C3 R2 | | CPM Hexane Treated Filter | x | | | | |
| 1 | | RTO 2 CPM C3 R3 | | CPM Hexane Treated Filter | x | | | | |
| 1 | | FTB C1 | | Condensate Plus Water Rinse | x | | | | |
| 1 | * | FTB C2 | | Acetone/Hexane Rinse | | | | | |
| 1 | | FTB C3 | | CPM Hexane Treated Filter | | | | | |
| 1 | * | CPM C6 | | Acetone Blank | x | | | | |
| 1 | | CPM C7 | | Water Blank | x | | | | |
| 1 | * | CPM C8 | | Hexane Blank | x | | | | |

| Relinquished by: (print name; initial) | Date/time | Received by: (print name; initial) | Date/time |
|---|---|---|---|
| Bill Norwood | 07/30/15 | Russell | 07/30/2015 |
| Relinquished by: (print name; initial) | Date/time | Received by: (print name; initial) | Date/time |
| Relinquished by: (print name; initial) Russell | Date/time 08/04/15 | Received by: (print name; initial) | Date/time |
| COURIER FED EX | Date Shipped 08/04/15 | Received for lab by: Temp = 26.4°C RGL | Date/time 8-5-15/1230 |

# This Is The Last Page Of This Report.

# *APPENDIX E*

# *OPERATING RECORDS*

# *(WESTERVELT)*

| Date and Time | Air Permit: highest oxidation temperatur | Furnace oxygen controller actual value in physical unit | Furnace temperature control firing rate | Wet flake silo discharge screw 1 motor 1 PV 1 |
|---|---|---|---|---|
| 7/30/15 9:53 | 1558.1 | 5.73 | 19.97 | 45 |
| 7/30/15 9:54 | 1558.6 | 5.73 | 22.17 | 45 |
| 7/30/15 9:55 | 1559.9 | 5.73 | 27.20 | 45 |
| 7/30/15 9:56 | 1557.3 | 5.73 | 25.31 | 45 |
| 7/30/15 9:57 | 1556.5 | 5.73 | 22.64 | 45 |
| 7/30/15 9:58 | 1557.0 | 5.73 | 22.38 | 45 |
| 7/30/15 9:59 | 1555.7 | 5.71 | 18.13 | 45 |
| 7/30/15 10:00 | 1556.6 | 5.71 | 20.34 | 45 |
| 7/30/15 10:01 | 1559.3 | 5.73 | 20.34 | 45 |
| 7/30/15 10:02 | 1558.5 | 5.72 | 28.83 | 45 |
| 7/30/15 10:03 | 1558.3 | 5.70 | 22.93 | 45 |
| 7/30/15 10:04 | 1559.6 | 5.72 | 24.80 | 45 |
| 7/30/15 10:05 | 1559.6 | 5.72 | 19.78 | 45 |
| 7/30/15 10:06 | 1560.1 | 5.73 | 19.33 | 45 |
| 7/30/15 10:07 | 1562.2 | 5.71 | 20.95 | 45 |
| 7/30/15 10:08 | 1562.6 | 5.73 | 20.11 | 45 |
| 7/30/15 10:09 | 1561.5 | 5.73 | 12.76 | 45 |
| 7/30/15 10:10 | 1562.0 | 5.73 | 20.40 | 45 |
| 7/30/15 10:11 | 1562.6 | 5.71 | 23.19 | 45 |
| 7/30/15 10:12 | 1562.2 | 5.73 | 30.35 | 45 |
| 7/30/15 10:13 | 1562.9 | 5.73 | 30.69 | 45 |
| 7/30/15 10:14 | 1562.4 | 5.73 | 21.70 | 45 |
| 7/30/15 10:15 | 1558.6 | 5.73 | 25.63 | 45 |
| 7/30/15 10:16 | 1557.3 | 5.73 | 27.02 | 45 |
| 7/30/15 10:17 | 1557.0 | 5.73 | 31.35 | 45 |
| 7/30/15 10:18 | 1554.9 | 5.73 | 26.76 | 45 |
| 7/30/15 10:19 | 1555.1 | 5.73 | 21.96 | 45 |
| 7/30/15 10:20 | 1557.5 | 5.73 | 26.29 | 45 |
| 7/30/15 10:21 | 1555.3 | 5.73 | 15.30 | 45 |
| 7/30/15 10:22 | 1554.8 | 5.73 | 15.64 | 45 |
| 7/30/15 10:23 | 1556.0 | 5.74 | 20.66 | 45 |
| 7/30/15 10:24 | 1556.3 | 5.74 | 16.81 | 45 |
| 7/30/15 10:25 | 1558.0 | 5.74 | 22.60 | 45 |
| 7/30/15 10:26 | 1561.9 | 5.73 | 27.76 | 45 |
| 7/30/15 10:27 | 1563.5 | 5.73 | 24.54 | 45 |
| 7/30/15 10:28 | 1563.8 | 5.73 | 19.05 | 45 |
| 7/30/15 10:29 | 1564.9 | 5.73 | 22.99 | 45 |
| 7/30/15 10:30 | 1564.8 | 5.73 | 24.53 | 45 |
| 7/30/15 10:31 | 1563.7 | 5.73 | 29.34 | 45 |
| 7/30/15 10:32 | 1564.4 | 5.73 | 26.65 | 45 |
| 7/30/15 10:33 | 1564.4 | 5.73 | 23.46 | 45 |
| 7/30/15 10:34 | 1560.4 | 5.73 | 16.76 | 45 |
| 7/30/15 10:35 | 1559.1 | 5.73 | 15.63 | 45 |
| 7/30/15 10:36 | 1559.3 | 5.73 | 24.54 | 45 |
| 7/30/15 10:37 | 1557.9 | 5.74 | 26.04 | 45 |
| 7/30/15 10:38 | 1558.4 | 5.73 | 28.60 | 45 |
| 7/30/15 10:39 | 1560.5 | 5.74 | 33.73 | 45 |
| 7/30/15 10:40 | 1558.2 | 5.74 | 29.12 | 45 |
| 7/30/15 10:41 | 1557.7 | 5.73 | 18.32 | 45 |
| 7/30/15 10:42 | 1557.9 | 5.74 | 19.15 | 45 |
| 7/30/15 10:43 | 1556.4 | 5.74 | 17.41 | 45 |
| 7/30/15 10:44 | 1556.6 | 5.74 | 25.88 | 45 |
| 7/30/15 10:45 | 1559.0 | 5.73 | 22.47 | 45 |
| 7/30/15 10:46 | 1558.6 | 5.74 | 19.66 | 45 |
| 7/30/15 10:47 | 1557.8 | 5.75 | 27.69 | 45 |
| 7/30/15 10:48 | 1558.9 | 5.75 | 27.49 | 45 |
| 7/30/15 10:49 | 1559.2 | 5.74 | 23.13 | 45 |
| 7/30/15 10:50 | 1559.5 | 5.74 | 25.62 | 45 |
| 7/30/15 10:51 | 1561.2 | 5.75 | 18.91 | 45 |
| 7/30/15 10:52 | 1561.6 | 5.73 | 20.15 | 45 |
| 7/30/15 10:53 | 1559.4 | 5.74 | 17.92 | 45 |
| 7/30/15 10:54 | 1559.5 | 5.74 | 24.57 | 45 |
| 7/30/15 10:55 | 1560.6 | 5.73 | 23.51 | 45 |
| 7/30/15 10:56 | 1559.8 | 5.74 | 35.05 | 45 |
| 7/30/15 10:57 | 1561.0 | 5.74 | 26.63 | 45 |
| 7/30/15 10:58 | 1562.9 | 5.75 | 26.46 | 45 |
| 7/30/15 10:59 | 1559.8 | 5.74 | 21.74 | 45 |
| 7/30/15 11:00 | 1559.0 | 5.73 | 20.30 | 45 |
| 7/30/15 11:01 | 1559.2 | 5.73 | 22.97 | 45 |
| 7/30/15 11:02 | 1557.4 | 5.73 | 24.18 | 45 |
| 7/30/15 11:03 | 1557.7 | 5.73 | 27.78 | 45 |
| 7/30/15 11:04 | 1560.5 | 5.72 | 23.49 | 45 |
| Average | 1559.5 | 5.73 | 23.30 | 45 |

| Date and Time | Air Permit: highest oxidation temperatur | Furnace oxygen controller actual value in physical unit | Furnace temperature control firing rate | Wet flake silo discharge screw 1 motor 1 PV 1 |
|---|---|---|---|---|
| 7/30/15 11:30 | 1554.3 | 5.60 | 21.98 | 45 |
| 7/30/15 11:31 | 1551.7 | 5.61 | 21.15 | 45 |
| 7/30/15 11:32 | 1552.2 | 5.61 | 24.01 | 45 |
| 7/30/15 11:33 | 1553.8 | 5.59 | 22.66 | 45 |
| 7/30/15 11:34 | 1555.1 | 5.60 | 18.18 | 45 |
| 7/30/15 11:35 | 1559.1 | 5.60 | 21.57 | 45 |
| 7/30/15 11:36 | 1563.8 | 5.62 | 25.52 | 45 |
| 7/30/15 11:37 | 1564.4 | 5.61 | 20.40 | 45 |
| 7/30/15 11:38 | 1566.5 | 5.58 | 14.06 | 45 |
| 7/30/15 11:39 | 1568.8 | 5.59 | 24.58 | 45 |
| 7/30/15 11:40 | 1568.0 | 5.58 | 27.33 | 45 |
| 7/30/15 11:41 | 1568.8 | 5.57 | 27.01 | 45 |
| 7/30/15 11:42 | 1570.9 | 5.55 | 24.56 | 45 |
| 7/30/15 11:43 | 1566.9 | 5.56 | 31.31 | 45 |
| 7/30/15 11:44 | 1564.2 | 5.55 | 28.46 | 45 |
| 7/30/15 11:45 | 1563.2 | 5.54 | 24.03 | 45 |
| 7/30/15 11:46 | 1560.2 | 5.52 | 25.11 | 45 |
| 7/30/15 11:47 | 1558.3 | 5.52 | 26.99 | 45 |
| 7/30/15 11:48 | 1558.4 | 5.51 | 31.09 | 45 |
| 7/30/15 11:49 | 1556.6 | 5.49 | 29.25 | 45 |
| 7/30/15 11:50 | 1553.8 | 5.49 | 16.29 | 45 |
| 7/30/15 11:51 | 1553.1 | 5.49 | 19.25 | 45 |
| 7/30/15 11:52 | 1552.9 | 5.47 | 24.42 | 45 |
| 7/30/15 11:53 | 1553.0 | 5.45 | 18.49 | 45 |
| 7/30/15 11:54 | 1555.4 | 5.43 | 19.14 | 45 |
| 7/30/15 11:55 | 1558.1 | 5.42 | 22.26 | 45 |
| 7/30/15 11:56 | 1557.5 | 5.41 | 17.47 | 45 |
| 7/30/15 11:57 | 1559.2 | 5.38 | 12.54 | 45 |
| 7/30/15 11:58 | 1561.7 | 5.38 | 16.99 | 45 |
| 7/30/15 11:59 | 1561.9 | 5.37 | 20.16 | 45 |
| 7/30/15 12:00 | 1564.5 | 5.35 | 18.58 | 45 |
| 7/30/15 12:01 | 1568.2 | 5.33 | 15.99 | 45 |
| 7/30/15 12:02 | 1566.6 | 5.32 | 22.44 | 45 |
| 7/30/15 12:03 | 1566.4 | 5.31 | 27.18 | 45 |
| 7/30/15 12:04 | 1567.2 | 5.28 | 23.11 | 45 |
| 7/30/15 12:05 | 1565.1 | 5.24 | 24.23 | 45 |
| 7/30/15 12:06 | 1563.8 | 5.22 | 27.21 | 45 |
| 7/30/15 12:07 | 1563.9 | 5.20 | 20.77 | 45 |
| 7/30/15 12:08 | 1559.9 | 5.17 | 19.95 | 45 |
| 7/30/15 12:09 | 1556.3 | 5.15 | 17.16 | 45 |
| 7/30/15 12:10 | 1555.1 | 5.14 | 22.37 | 45 |
| 7/30/15 12:11 | 1554.2 | 5.11 | 19.29 | 45 |
| 7/30/15 12:12 | 1553.4 | 5.09 | 16.72 | 45 |
| 7/30/15 12:13 | 1555.3 | 5.08 | 24.30 | 45 |
| 7/30/15 12:14 | 1557.5 | 5.07 | 31.84 | 45 |
| 7/30/15 12:15 | 1557.3 | 5.05 | 27.30 | 45 |
| 7/30/15 12:16 | 1558.4 | 5.02 | 22.13 | 45 |
| 7/30/15 12:17 | 1559.1 | 5.00 | 13.61 | 45 |
| 7/30/15 12:18 | 1558.3 | 5.00 | 16.26 | 45 |
| 7/30/15 12:19 | 1560.3 | 4.97 | 16.41 | 45 |
| 7/30/15 12:20 | 1564.3 | 4.96 | 19.57 | 45 |
| 7/30/15 12:21 | 1562.6 | 4.93 | 19.04 | 45 |
| 7/30/15 12:22 | 1563.0 | 4.92 | 20.90 | 45 |
| 7/30/15 12:23 | 1565.2 | 4.90 | 23.74 | 45 |
| 7/30/15 12:24 | 1564.8 | 4.88 | 20.82 | 45 |
| 7/30/15 12:25 | 1565.1 | 4.86 | 27.53 | 45 |
| 7/30/15 12:26 | 1565.6 | 4.86 | 23.60 | 45 |
| 7/30/15 12:27 | 1561.8 | 4.84 | 23.50 | 45 |
| 7/30/15 12:28 | 1559.1 | 4.82 | 23.70 | 45 |
| 7/30/15 12:29 | 1558.3 | 4.82 | 20.00 | 45 |
| 7/30/15 12:30 | 1556.3 | 4.80 | 17.37 | 45 |
| 7/30/15 12:31 | 1555.4 | 4.79 | 24.79 | 45 |
| 7/30/15 12:32 | 1556.6 | 4.78 | 29.62 | 45 |
| 7/30/15 12:33 | 1556.3 | 4.77 | 29.09 | 45 |
| 7/30/15 12:34 | 1554.7 | 4.77 | 18.76 | 45 |
| 7/30/15 12:35 | 1554.8 | 4.76 | 19.46 | 45 |
| 7/30/15 12:36 | 1555.0 | 4.73 | 21.29 | 45 |
| 7/30/15 12:37 | 1554.3 | 4.74 | 12.89 | 45 |
| 7/30/15 12:38 | 1556.3 | 4.72 | 10.30 | 45 |
| 7/30/15 12:39 | 1560.1 | 4.71 | 23.79 | 45 |
| 7/30/15 12:40 | 1559.4 | 4.70 | 24.08 | 45 |
| 7/30/15 12:41 | 1560.8 | 4.69 | 24.45 | 45 |
| 7/30/15 12:42 | 1563.2 | 4.68 | 20.34 | 45 |
| 7/30/15 12:43 | 1562.7 | 4.66 | 32.29 | 45 |
| 7/30/15 12:44 | 1564.0 | 4.66 | 19.64 | 45 |
| 7/30/15 12:45 | 1565.9 | 4.65 | 20.53 | 45 |
| 7/30/15 12:46 | 1562.3 | 4.63 | 13.11 | 45 |
| 7/30/15 12:47 | 1560.2 | 4.62 | 22.43 | 45 |
| 7/30/15 12:48 | 1560.5 | 4.62 | 32.82 | 45 |
| 7/30/15 12:49 | 1559.5 | 4.61 | 30.23 | 45 |
| 7/30/15 12:50 | 1559.0 | 4.60 | 26.72 | 45 |
| Average | 1560.1 | 5.14 | 22.22 | 45 |

| Date and Time | Air Permit: highest oxidation temperatur | Furnace oxygen controller actual value in physical unit | Furnace temperature control firing rate | Wet flake silo discharge screw 1 motor 1 PV 1 |
|---|---|---|---|---|
| 7/30/15 13:15 | 1557.2 | 4.42 | 18.79 | 45 |
| 7/30/15 13:16 | 1560.2 | 4.42 | 29.43 | 45 |
| 7/30/15 13:17 | 1562.6 | 4.41 | 28.44 | 45 |
| 7/30/15 13:18 | 1561.2 | 4.41 | 26.32 | 45 |
| 7/30/15 13:19 | 1561.8 | 4.41 | 15.67 | 45 |
| 7/30/15 13:20 | 1562.6 | 4.40 | 18.78 | 45 |
| 7/30/15 13:21 | 1560.8 | 4.39 | 19.84 | 45 |
| 7/30/15 13:22 | 1561.2 | 4.39 | 21.90 | 45 |
| 7/30/15 13:23 | 1563.5 | 4.38 | 20.75 | 45 |
| 7/30/15 13:24 | 1560.5 | 4.39 | 32.56 | 45 |
| 7/30/15 13:25 | 1559.5 | 4.39 | 26.23 | 45 |
| 7/30/15 13:26 | 1560.2 | 4.39 | 22.64 | 45 |
| 7/30/15 13:27 | 1558.8 | 4.38 | 20.35 | 45 |
| 7/30/15 13:28 | 1558.6 | 4.36 | 21.51 | 45 |
| 7/30/15 13:29 | 1559.8 | 4.36 | 25.10 | 45 |
| 7/30/15 13:30 | 1557.4 | 4.38 | 24.13 | 45 |
| 7/30/15 13:31 | 1555.6 | 4.38 | 20.58 | 45 |
| 7/30/15 13:32 | 1555.9 | 4.38 | 26.93 | 45 |
| 7/30/15 13:33 | 1555.6 | 4.36 | 26.01 | 45 |
| 7/30/15 13:34 | 1555.7 | 4.37 | 25.29 | 45 |
| 7/30/15 13:35 | 1557.2 | 4.36 | 22.65 | 45 |
| 7/30/15 13:36 | 1556.7 | 4.36 | 25.28 | 45 |
| 7/30/15 13:37 | 1554.6 | 4.36 | 17.33 | 45 |
| 7/30/15 13:38 | 1554.9 | 4.37 | 27.23 | 45 |
| 7/30/15 13:39 | 1555.8 | 4.38 | 22.05 | 45 |
| 7/30/15 13:40 | 1555.2 | 4.37 | 18.06 | 45 |
| 7/30/15 13:41 | 1558.0 | 4.38 | 20.25 | 45 |
| 7/30/15 13:42 | 1563.1 | 4.39 | 17.37 | 45 |
| 7/30/15 13:43 | 1562.4 | 4.38 | 15.48 | 45 |
| 7/30/15 13:44 | 1563.7 | 4.38 | 19.38 | 45 |
| 7/30/15 13:45 | 1566.5 | 4.38 | 21.22 | 45 |
| 7/30/15 13:46 | 1566.7 | 4.41 | 25.35 | 45 |
| 7/30/15 13:47 | 1567.7 | 4.42 | 24.43 | 45 |
| 7/30/15 13:48 | 1569.4 | 4.42 | 25.55 | 45 |
| 7/30/15 13:49 | 1566.6 | 4.42 | 28.24 | 45 |
| 7/30/15 13:50 | 1563.9 | 4.43 | 29.32 | 45 |
| 7/30/15 13:51 | 1562.7 | 4.43 | 26.06 | 45 |
| 7/30/15 13:52 | 1560.1 | 4.44 | 23.60 | 45 |
| 7/30/15 13:53 | 1557.9 | 4.44 | 22.26 | 45 |
| 7/30/15 13:54 | 1558.9 | 4.45 | 28.35 | 45 |
| 7/30/15 13:55 | 1558.8 | 4.45 | 30.50 | 45 |
| 7/30/15 13:56 | 1556.9 | 4.47 | 31.21 | 45 |
| 7/30/15 13:57 | 1556.5 | 4.49 | 30.39 | 45 |
| 7/30/15 13:58 | 1556.2 | 4.50 | 29.76 | 45 |
| 7/30/15 13:59 | 1555.6 | 4.51 | 30.50 | 45 |
| 7/30/15 14:00 | 1556.8 | 4.52 | 31.96 | 45 |
| 7/30/15 14:01 | 1557.8 | 4.54 | 29.44 | 45 |
| 7/30/15 14:02 | 1554.1 | 4.55 | 22.01 | 45 |
| 7/30/15 14:03 | 1553.9 | 4.55 | 17.95 | 45 |
| 7/30/15 14:04 | 1555.7 | 4.56 | 19.34 | 45 |
| 7/30/15 14:05 | 1555.5 | 4.57 | 24.50 | 45 |
| 7/30/15 14:06 | 1558.1 | 4.57 | 25.03 | 45 |
| 7/30/15 14:07 | 1562.8 | 4.57 | 20.27 | 45 |
| 7/30/15 14:08 | 1563.1 | 4.59 | 23.45 | 45 |
| 7/30/15 14:09 | 1564.0 | 4.62 | 25.27 | 45 |
| 7/30/15 14:10 | 1566.0 | 4.62 | 18.97 | 45 |
| 7/30/15 14:11 | 1565.8 | 4.63 | 30.29 | 45 |
| 7/30/15 14:12 | 1565.7 | 4.63 | 25.07 | 45 |
| 7/30/15 14:13 | 1567.4 | 4.64 | 29.02 | 45 |
| 7/30/15 14:14 | 1566.1 | 4.64 | 26.90 | 45 |
| 7/30/15 14:15 | 1563.1 | 4.65 | 15.71 | 45 |
| 7/30/15 14:16 | 1562.2 | 4.65 | 17.34 | 45 |
| 7/30/15 14:17 | 1561.1 | 4.66 | 28.30 | 45 |
| 7/30/15 14:18 | 1559.3 | 4.68 | 28.97 | 45 |
| 7/30/15 14:19 | 1559.4 | 4.68 | 27.03 | 45 |
| 7/30/15 14:20 | 1558.3 | 4.70 | 23.24 | 45 |
| Average | 1560.2 | 4.47 | 24.14 | 45 |
| Overall Average | 1559.9 | 5.13 | 23.15 | 45 |

**THIS IS THE LAST PAGE**

**OF THIS REPORT**

# *VOC EMISSIONS TEST*

# *REGENERATIVE CATALYTIC OXIDIZER NO.2 (RTO2)*
# *BAGHOUSE (BH1)*

# *WESTERVELT PELLETS I, LLC*

## *ALICEVILLE, ALABAMA PELLET PLANT*

*PERMIT NO. 409-0010-X011*

*Aliceville, Alabama*
*October 2-3, 2018*

Westervelt Pellets I, LLC
6777 Highway 17
Aliceville, Alabama 35442

*Performed by:*

**EML, LLC**

624 Ridgewood Road
P.O. Box 655
Ridgeland, Mississippi 39158

Phone: (601)856-3092

REPORT OF
AIR EMISSIONS TEST
FOR
WESTERVELT PELLETS I, LLC
REGENERATIVE CATALYTIC OXIDIZER NO. 2 (RTO2)
AND THE BAGHOUSE (BH1)

Aliceville, Alabama
October 2-3, 2018

PERMIT NO. 409-0010-X011


Westervelt Pellets I, LLC
Post Office Box 48999
Tuscaloosa, Alabama 35404

Contact: Keith Dollar
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Email:kdollar@westervelt.com



*Performed By:*
*EML, LLC*
*Ridgeland, Mississippi*
*601/856-3092*

P.O. Box 655 624 Ridgewood Road
Ridgeland, Mississippi 39158

Phone: 601/856-3092

EXECUTIVE SUMMARY OF AIR EMISSIONS TEST

Westervelt Pellets I, LLC - Aliceville, Alabama

Report date: October 9, 2018

On October 2-3, 2018, EML, LLC performed air emissions testing for Westervelt Pellets I, LLC in Aliceville, Alabama. Testing was performed to measure VOCs as propane from the RCO No. 2 (RTO2) and the Baghouse (BH1). At the time of the baghouse test, the aspiration system valves that connect the four pellet shaker screens, and the pre and post-conveyors to the baghouse were closed. This change to the baghouse system is considered to be temporary and it is understood that additional compliance testing for the baghouse will be required should these valves be opened. This testing was done in accordance with requirements of Air Permit No. 409-0010-X011 issued and administered by the Alabama Department of Environmental Management (ADEM.)

Measured emissions are summarized in the tables below. The results reported are the average of three 60-minute sample runs.

| Source | VOC, ppm as propane | VOC, lb/hr as propane |
|---|---|---|
| RTO2 | 8.5 | 0.66 |
| BH1 | 99.9 | 5.52 |
| Permit Limit | --- | 44.29 Total |

Keith Dollar of Westervelt Pellets coordinated the testing project. The EML test team included Otis Rayburn, Greg Shelnutt and Cory Harkins. Jared Avrard of ADEM were present to witness the test.

Following is a report of the test.

# REPORT OF AIR EMISSIONS TESTING
# FOR WESTERVELT PELLETS I, LLC
# RTO2 and BAGHOUSE (BH1)
# ALICEVILLE, ALABAMA
# OCTOBER 2-3, 2018

## CONTENTS

## REPORT CERTIFICATION

I certify that I have examined the information submitted herein, and based upon inquires of those responsible for obtaining the data or upon my direct acquisition of data, I believe the submitted information is true, accurate and complete.

Signed ____________________

Manager

# *1.0 TEST RESULTS*

The following table is a summary of the measured flow parameters and test results for emissions testing done on October 2-3, 2018, for the RCO No. 2 and the Baghouse at Westervelt's wood pellet plant in Aliceville, Alabama.

## RCO No. 2

| Run No. | | 1 | 2 | 3 | AVG |
|---|---|---|---|---|---|
| Date | | 10/2/2018 | 10/2/2018 | 10/2/2018 | ------- |
| Time Start | | 0922 | 1247 | 1355 | ----- |
| Time End | | 1236 | 1347 | 1553 | ----- |
| VOC EMISSIONS C3H8 | #/hr | 0.67 | 0.66 | 0.65 | 0.66 |
| VOC EMISSIONS C3H8 | ppm | 8.7 | 8.4 | 8.4 | 8.5 |
| $O_2$ | % | 20.65 | 20.60 | 20.60 | 20.62 |
| VOLUMETRIC FLOW RATE | acfm | 50256 | 52327 | 52192 | 52192 |
| VOLUMETRIC FLOW RATE | dscfm | 40916 | 41774 | 41819 | 41503 |
| VELOCITY | ft./sec. | 29.1 | 30.3 | 30.2 | 29.9 |
| STACK TEMPERATURE | ºF | 142 | 144 | 146 | 144 |
| MOISTURE | % | 7.8 | 9.2 | 8.5 | 8.5 |

## Baghouse (BH1)

| Run No. | | 1 | 2 | 3 | AVG |
|---|---|---|---|---|---|
| Date | | 10/3/2018 | 10/3/2018 | 10/3/2018 | ------- |
| Time Start | | 0747 | 1000 | 1109 | ----- |
| Time End | | 0953 | 1100 | 1209 | ----- |
| VOC EMISSIONS C3H8 | #/hr | 4.78 | 5.47 | 6.32 | 5.52 |
| VOC EMISSIONS C3H8 | ppm | 83.7 | 99.9 | 116.1 | 99.9 |
| $O_2$ | % | 20.70 | 20.70 | 20.70 | 20.70 |
| VOLUMETRIC FLOW RATE | acfm | 34865 | 34411 | 34159 | 34478 |
| VOLUMETRIC FLOW RATE | dscfm | 30516 | 29280 | 29126 | 29641 |
| VELOCITY | ft./sec. | 55.0 | 54.3 | 53.9 | 54.4 |
| STACK TEMPERATURE | °F | 119 | 126 | 132 | 126 |
| MOISTURE | % | 4.4 | 5.8 | 4.7 | 5.0 |

## *2.0 SOURCE DESCRIPTION:*

Westervelt Pellets I, LLC in Aliceville, Alabama is a producer of pine wood pellets. Chips, shavings, and sawdust are sent to the rotary dryer to be dried for pellet production. Once the material is sent through the dryer, it goes to the dry silo before being fed to eight pellet presses and the material is formed into pellets in the pellet presses. Finished pellets are sent to four pellet coolers and the exhaust from the pellet coolers go through four cyclones and then to RCO No. 2 via a common duct.

The RCO exhausts to the atmosphere by way of a 72.625-inch circular vertical stack. Two sample ports are provided at a location that is 192 inches (2.6 diameters) below the stack exit and 180 inches (2.5 diameters) above the blower duct to stack.

The Baghouse exhausts to the atmosphere by way of a 44.0-inch circular vertical stack. Two sample ports are provided at a location that is 24 inches below the stack exit (0.5 diameters) and 106 inches (2.4 diameters) above the nearest flow disturbance.

## *3.0 TEST PROCEDURES:*

Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. All test parameters were measured simultaneously. The test consisted of triplicate 60-minute sample runs.

### *Sample and Velocity Traverses – EPA Method 1*

Selection of sampling locations was as described in Method 1. Sample ports are installed at locations meeting requirements of the Method. Laminar airflow at sample locations was confirmed using the null Pitot technique.

### *Determination of Stack Gas Velocity and Volumetric Flow Rate – EPA Method 2*

Stack gas velocity was measured using an S-Type Pitot tube and Method 2. Pitot tube design and its orientation with respect to the sample probe and nozzle permitted the use of a correction factor (Cp) of 0.84 as described in Method 2. Stack temperature measurements were made with a type K thermocouple and NBS calibration traceable digital thermometer.

## *Gas Analysis for the Determination of Dry Molecular Weight – EPA Method 3A*

Oxygen and carbon dioxide content was measured by continuous monitoring with calibrated analyzers as described in Method 3A. Zero and mid level span checks were performed following each sample run. Pre test calibrations were made by introducing the gas standards at the inlet to the sample conditioner; post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe

## *Determination of Moisture Content in Stack Gas – EPA Method 4*

Moisture content was determined from volumetric and gravimetric analysis of impinger contents of the Method 5 sample train.

## *Determination of Total Volatile Organic Compounds – EPA Method 25A*

VOC (as carbon) was measured using Method 25A. A calibrated TECO Model 51 heated flame ionization detector was used to continuously monitor VOC concentration on a wet basis. A sample was directed to the analyzers by way of a Teflon sample line heated to $250^{O}$ F. A helium/hydrogen fuel was used to reduce oxygen synergism impact on the measurements. The instrument was calibrated with known concentrations of propane. For this testing project, results are expressed in terms of propane. Triplicate 60 minute sampling periods constituted a test. Pre test calibrations and post run zero and span checks were made through the sample system by introducing calibration gas at the inlet to the sample probe.

## *Preparation of Calibration Gases – EPA Method 205*

Calibration gas concentrations were prepared using cylinders of EPA Protocol 1 gas mixtures and an Environics gas diluter verified by Method 205.

## *Data Acquisition.*

Instrument data was recorded on a Fluke Hydra data logger at 5-second intervals and reduced to 60-second averages. The arithmetic average of each instrument's output was used to calculate emissions.

# *4.0 CALCULATIONS*

RCO 2

VOC Emissions Test - October 2, 2018

*Collected Test Data:*

| | | | | RUN 1 | RUN 2 | RUN 3 |
|---|---|---|---|---|---|---|
| | Date | : | | 10/2/2018 | 10/2/2018 | 10/2/2018 |
| | Time start | : | | 0922 | 1247 | 1355 |
| | Time end | : | | 1236 | 1347 | 1553 |
| 1. | As | : | sq ft | 28.7673 | 28.7673 | 28.7673 |
| 2. | Cp | : | dimensionless | 0.84 | 0.84 | 0.84 |
| 3. | Theta | : | minutes | 60.00 | 60.00 | 60.00 |
| 4. | Y | : | dimensionless | 0.997 | 0.997 | 0.997 |
| 5. | Pbar | : | in. Hg | 30.12 | 30.11 | 30.08 |
| 6. | Pg | : | in. H2O | -0.18 | -0.18 | -0.18 |
| 7. | Vm | : | cf (dry gas) | 29.048 | 29.383 | 29.890 |
| 8. | √(ΔP),avg | : | in.H2O^.5 | 0.4800 | 0.4973 | 0.4958 |
| 9. | ΔH | : | in. H2O | 0.7000 | 0.7000 | 0.7000 |
| 10. | ts | : | degrees F | 141.83 | 144.29 | 145.71 |
| 11. | tm | : | degrees F | 76.38 | 79.29 | 81.29 |
| 12. | Vlc | : | ml | 51.5 | 62 | 58 |
| 13. | CO2 | : | percent | 0.21 | 0.21 | 0.20 |
| 14. | O2 | : | percent | 20.65 | 20.60 | 20.60 |
| 15. | C,VOC | : | ppm as Propane | 8.04 | 7.65 | 7.64 |

# RCO 2

## VOC Emissions Test - October 2, 2018

*Calculations:*

| | | | | RUN 1 | RUN 2 | RUN 3 | AVG. |
|---|---|---|---|---|---|---|---|
| 1. | Pm | : | in.Hg<br>(ΔH/13.6)+Pbar | 30.171 | 30.161 | 30.131 | 30.155 |
| 2. | Ps | : | in. Hg<br>(Pg/13.6)+Pbar | 30.107 | 30.097 | 30.067 | 30.090 |
| 3. | Vmstd | : | dscf<br>Vm Y(Pm/Pstd)(Tstd/Tm) | 28.748 | 28.913 | 29.274 | 28.978 |
| 4. | Vwstd | : | scf<br>(.04707cf/ml)(Vlc) | 2.424 | 2.918 | 2.730 | 2.691 |
| 5. | Bws | : | dimensionless<br>Vwstd/(Vwstd+Vmstd) | 0.0778 | 0.0917 | 0.0853 | 0.0849 |
| 6. | Md | : | mol.wt. dry basis<br>.44 CO2+.32 O2+.28(CO+N2) | 28.86 | 28.86 | 28.86 | 28.86 |
| 7. | Ms | : | mol.wt. wet basis<br>Md(1-Bws)+18 Bws | 28.02 | 27.86 | 27.93 | 27.94 |
| 8. | Vs | : | ft/sec<br>Kp Cp (√ΔP)√(Ts/(Ps Ms)) | 29.12 | 30.32 | 30.24 | 29.89 |
| 9. | Q | : | cfm<br>Vs As(60 sec/min) | 50256 | 52327 | 52192 | 51592 |
| 10. | Qstw | : | scfm<br>Q(Ps/Pstd)(Tstd/Ts) | 44366 | 45991 | 45719 | 45359 |
| 11. | Qstd | : | dscfm<br>Qstw(1-Bws) | 40916 | 41774 | 41819 | 41503 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *12.* | C'VOC | : | ppm as Propane, dry<br>(((C,VOC)/(1-Bws)) | 8.7 | 8.4 | 8.4 | 8.5 |
| *13.* | E,VOC | : | pounds/hr<br>(C'VOC)(3.116e-8)(Qstd)(60) | 0.67 | 0.66 | 0.65 | 0.66 |

# Baghouse (BH1)
# VOC Emissions Test - October 3, 2018

*Collected Test Data:*

| | | | | RUN 1 | RUN 2 | RUN 3 |
|---|---|---|---|---|---|---|
| | Date | : | | 10/3/2018 | 10/3/2018 | 10/3/2018 |
| | Time start | : | | 0747 | 1000 | 1109 |
| | Time end | : | | 0953 | 1100 | 1209 |
| 1. | As | : | sq ft | 10.5592 | 10.5592 | 10.5592 |
| 2. | Cp | : | dimensionless | 0.84 | 0.84 | 0.84 |
| 3. | Theta | : | minutes | 60.00 | 60.00 | 60.00 |
| 4. | Y | : | dimensionless | 0.997 | 0.997 | 0.997 |
| 5. | Pbar | : | in. Hg | 30.06 | 30.06 | 30.06 |
| 6. | Pg | : | in. H2O | -0.56 | -0.56 | -0.56 |
| 7. | Vm | : | cf (dry gas) | 29.080 | 29.485 | 29.677 |
| 8. | √(ΔP),avg | : | in.H2O^.5 | 0.9296 | 0.9090 | 0.8999 |
| 9. | ΔH | : | in. H2O | 0.7000 | 0.7000 | 0.7000 |
| 10. | ts | : | degrees F | 118.70 | 126.35 | 132.05 |
| 11. | tm | : | degrees F | 76.05 | 79.60 | 80.65 |
| 12. | Vlc | : | ml | 28 | 38 | 30.5 |
| 13. | CO2 | : | percent | 0.10 | 0.10 | 0.10 |
| 14. | O2 | : | percent | 20.70 | 20.70 | 20.70 |
| 15. | C,VOC | : | ppm as Propane | 80.06 | 94.11 | 110.60 |

Baghouse (BH1)

VOC Emissions Test - October 3, 2018

*Calculations:*

| # | Parameter | | Units / Formula | RUN 1 | RUN 2 | RUN 3 | AVG. |
|---|---|---|---|---|---|---|---|
| 1. | Pm | : | in.Hg<br>(ΔH/13.6)+Pbar | 30.111 | 30.111 | 30.111 | 30.111 |
| 2. | Ps | : | in. Hg<br>(Pg/13.6)+Pbar | 30.019 | 30.019 | 30.019 | 30.019 |
| 3. | Vmstd | : | dscf<br>Vm Y(Pm/Pstd)(Tstd/Tm) | 28.740 | 28.949 | 29.081 | 28.923 |
| 4. | Vwstd | : | scf<br>(.04707cf/ml)(Vlc) | 1.318 | 1.789 | 1.436 | 1.514 |
| 5. | Bws | : | dimensionless<br>Vwstd/(Vwstd+Vmstd) | 0.0438 | 0.0582 | 0.0470 | 0.0497 |
| 6. | Md | : | mol.wt. dry basis<br>.44 CO2+.32 O2+.28(CO+N2) | 28.84 | 28.84 | 28.84 | 28.84 |
| 7. | Ms | : | mol.wt. wet basis<br>Md(1-Bws)+18 Bws | 28.37 | 28.21 | 28.33 | 28.31 |
| 8. | Vs | : | ft/sec<br>Kp Cp (√ΔP)√(Ts/(Ps Ms)) | 55.03 | 54.31 | 53.92 | 54.42 |
| 9. | Q | : | cfm<br>Vs As(60 sec/min) | 34865 | 34411 | 34159 | 34478 |
| 10. | Qstw | : | scfm<br>Q(Ps/Pstd)(Tstd/Ts) | 31915 | 31089 | 30564 | 31189 |
| 11. | Qstd | : | dscfm<br>Qstw(1-Bws) | 30516 | 29280 | 29126 | 29641 |

| # | Parameter | | Units / Formula | RUN 1 | RUN 2 | RUN 3 | AVG. |
|---|---|---|---|---|---|---|---|
| *12.* | C'VOC | : | ppm as Propane, dry<br>(((C,VOC)/(1-Bws)) | 83.7 | 99.9 | 116.1 | 99.91 |
| *13.* | E,VOC | : | pounds/hr<br>(C'VOC)(3.116e-8)(Qstd)(60) | 4.78 | 5.47 | 6.32 | 5.52 |

# 5.0 NOMENCLATURE

| SYMBOL | UNITS | DESCRIPTION |
|---|---|---|
| An | $ft^2$ | Nozzle cross sectional area |
| As | $ft^2$ | Stack cross sectional area |
| Bws | dimensionless | Wet gas fraction |
| $CO_2$ | percent | Carbon dioxide content by volume |
| CO | percent | Carbon monoxide content by volume |
| Cp | dimensionless | Pitot correction factor |
| C,X | as labeled | Concentration of pollutant X |
| DGF | dimensionless | Dry gas fraction |
| Dn | inches | Nozzle diameter |
| $\Delta$H (delta H) | in. $H_2O$ | Pressure drop across meter orifice |
| $\Delta$P (delta P) | in. $H_2O$ | Stack gas velocity pressure |
| E,X | #/hr | Emission rate of pollutant X |
| E'X | #/MM Btu | Emission rate of pollutant X |
| F | dscf | Volume of flue gas per MM Btu |
| I | percent | Nozzle velocity/stack gas velocity |
| Kp | consistent | Pitot tube constant |
| M,X | milligrams | Sample weight of pollutant X |
| Md | #/# mole | Dry molecular weight of stack gas |
| Ms | #/# mole | Wet molecular weight of stack gas |
| N2 | percent | Nitrogen content by volume, dry basis |
| $O_2$ | percent | Oxygen content by volume, dry basis |
| Pbar | in. Hg | Barometric pressure |
| Pg | in. Hg | Stack static pressure |
| Pm | in. Hg | Total pressure at meter (Pbar+($\Delta$H/13.6) |
| Ps | in. Hg | Total stack pressure (Pbar+(Pg/13.6)) |
| Pstd | in. Hg | Standard barometric pressure = 29.92 |
| Q | acfm | Volumetric flow rate at stack conditions |
| Qstd | dscfm | Volumetric flow rate at standard conditions, dry basis |
| Qstdw | scfm | Volumetric flow rate at standard conditions, wet basis |
| $\theta$ (theta) | minutes | Sample duration |
| tm | ºF | Meter temperature (Tm denotes ºR) |
| ts | ºF | Stack temperature (Ts denotes ºR) |
| tw | ºF | Stack gas wet bulb temperature |
| Tstd | ºR | Standard temperature = 528ºR |
| Vlc | ml | volume of water collected |
| Vm | $ft^3$ | Volume of dry gas sampled through meter |
| Vmstd | dscf | Sample volume at standard conditions |
| Vwstd | scf | Sample volume of water vapor |
| Y | dimensionless | Meter coefficient |
| Xsair | percent | Excess air |

# 6.0 CALIBRATIONS

Measurement devices used by EML, LLC that are subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

*Dry Gas Meter:*

Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired. Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. Midsouth Meter Service in Pearl, Mississippi provides this service. At 6-month intervals, or following any meter repair a five point calibration is performed described in APTD-0576 using either a wet test meter, calibrated dry gas meter (used exclusively for calibrations), or a calibrated orifice set as a standard reference. Following field use, gas meter calibrations are checked at intermediate orifice settings. If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

*Orifice:*

The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration. The calibration is included with the Dry Gas Meter Calibration.

*Nozzles:*

Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

*Pitot Tubes:*

Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those Pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration that it retains unless damaged.

*Temperature Measuring Instruments:*

All temperature measurements are made with type K thermocouples and digital thermocouple thermometers that have an initial calibration traceable to NBS. Additionally, thermocouple meters are checked annually for ± 2 degree accuracy using an electronic Fluke calibrator that is calibrated annually by the manufacturer. Thermocouples are checked during a test series against a reference thermometer. Continuity and proper thermocouple contact location are checked by challenging the thermocouple with a temperature change. (EMC Alternate Method (ALT-011))

*Barometer:*

Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

*Differential Pressure Gauges:*

Velocity head ($\Delta P$) and orifice pressure differential ($\Delta H$) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration. When Magnehelic® type gauges are used, they are calibrated against a water manometer prior to and following each use.

*Analytical Balance:*

Analytical balances are calibrated annually by Mettler-Toledo. Prior to each use, or daily, a quality control check is made using Class A weights of 0.5000 grams and 100.0000 grams. This check is conducted after leveling the balance and performing an internal zero and calibration.

## *7.0 APPENDICES*

*A. Field Data*

*B. Calibration Data*

*C. Analyzers Data Log*

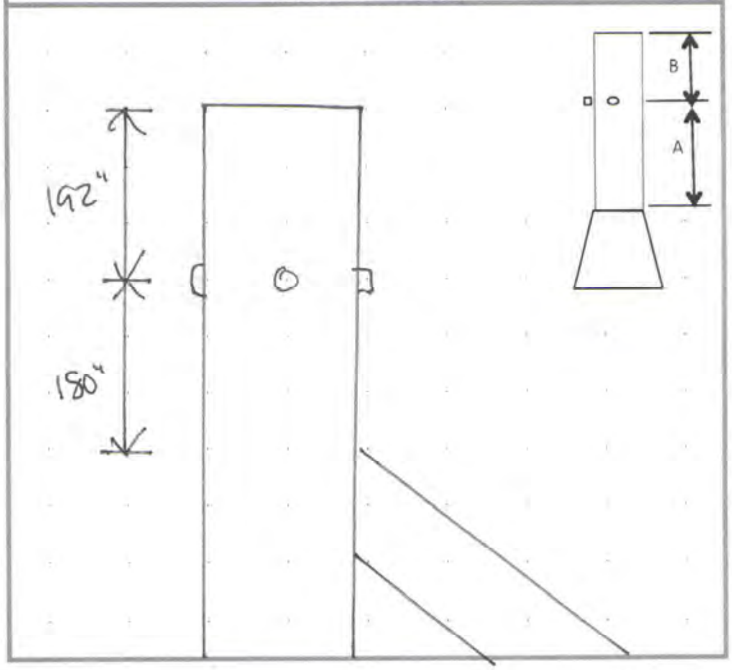
# *APPENDIX A*

# *FIELD DATA*

STACK CONFIGURATION AND SAMPLE POINT LAYOUT (EML V-0 Effective 093013)

PLANT: Westervelt Aliceville, AL  Date: 10-2-18
SOURCE: ~~RTO B~~ RCO B
TEST FOR: vel. moisture
TEST OPERATORS: Shelnutt

## SKETCH OF STACK



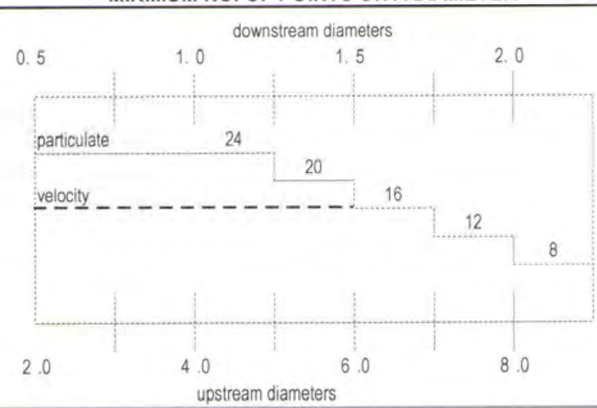

## PERCENT OF DIAMETER (for circular stacks)

| point no. | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|
| 1 | 14.6 | 6.7 | 4.4 | 3.2 | 2.6 | 2.1 | 1.8 | 1.6 |
| 2 | 85.4 | 25.0 | 14.6 | 10.5 | 8.2 | 6.7 | 5.7 | 4.9 |
| 3 | | 75.0 | 29.6 | 19.4 | 14.6 | 11.8 | 9.9 | 8.5 |
| 4 | | 93.3 | 70.4 | 32.3 | 22.6 | 17.7 | 14.6 | 12.5 |
| 5 | | | 85.4 | 67.7 | 34.2 | 25.0 | 20.1 | 16.9 |
| 6 | | | 95.6 | 80.6 | 65.8 | 35.6 | 26.9 | 22.0 |
| 7 | | | | 89.5 | 77.4 | 64.4 | 36.6 | 28.3 |
| 8 | | | | 96.8 | 85.4 | 75.0 | 63.4 | 37.5 |
| 9 | | | | | 91.8 | 82.3 | 73.1 | 62.5 |
| 10 | | | | | 97.4 | 88.2 | 79.9 | 71.7 |
| 11 | | | | | | 93.3 | 85.4 | 78.0 |
| 12 | | | | | | 97.9 | 90.1 | 83.1 |
| 13 | | | | | | | 94.3 | 87.5 |
| 14 | | | | | | | 98.2 | 91.5 |
| 15 | | | | | | | | 95.1 |
| 16 | | | | | | | | 98.4 |

| Point No. | inches from wall | velocity head ∝P1 | ∝P2 |
|---|---|---|---|
| 1 | 1.5 | 0 | 0 |
| 2 | 4.9 | 0 | 0 |
| 3 | 8.6 | 0 | 0 |
| 4 | 12.9 | 0 | 0 |
| 5 | 18.2 | 0 | 0 |
| 6 | 25.9 | 0 | 0 |
| 7 | 46.8 | 0 | 0 |
| 8 | 54.5 | 1 | 0 |
| 9 | 59.8 | 0 | 0 |
| 10 | 64.1 | 0 | 0 |
| 11 | 67.8 | 0 | 0 |
| 12 | 71.1 | 0 | 0 |

STACK DIAMETER: 72.625"
Distance from ports to disturbance:
A. to upstream disturbance 180"
B. to downstream disturbance 192"
Upstream diameters: 2.5
Downstream diameters: 2.6
Minimum No. sample points required: 24
No. sample points selected: 12x2
Port Length: 5 7/8"
Port Type: 4" pipe nipple
Port Access: platform/board

## MINIMUM NO. OF POINTS ON A DIAMETER




Pitot ID: 72610-1  Pitot Cp: 0.84  Stack Temp:

Remarks:

Plant: Westervelt    Aliceville, Al
Source: ~~RTO B~~ RCO B
Test For: Velocity · Moisture
Test Operators: Shelnutt · Harkins    T1

**RUN NO.** 1
Date 10-2-18
Time start 0922 end 1236

| | |
|---|---|
| Meter Box | AT3 / Y 0.997 |
| Sample Box | A |
| Probe/Pitot | 72610-1 |
| Pitot Cp | .84 |
| Nozzle Dia. | N/A |
| Filter No. | N/A |
| Amb. Temp. °F | 74 |
| Bar. Press "Hg | 30.12 |
| Static Press. "$H_2O$ | -0.18 |

No. Sample Pts. 12x2
Minutes/Pt. 2.5

K FACTOR SETUP
ΔH@ 1.76
Meter Temp
%$H_2O$
Stack Temp
K Factor

GAS ANALYSIS: CEM
$CO_2$
$O_2$
CO
Time

CONDENSATE: NOTES
init. ~~200~~ final 51.5
SILICA GEL:
init. final

Notes: DOWN 0954
UP 1207
Jared Avrard-ADEM

| | TARE | Final |
|---|---|---|
| 1) | 761.5 | 802 |
| 2) | 639 | 643.5 |
| 3) | 651.5 | 652 |
| 4) | 875 | 881 |

| Line | Port Point | Elapsed Time Min:sec | DGM Reading Ft.³ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp. Temp °F | VAC in Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 000 | 321.002 | 0.33 | 0.70 | 148 | 77 | 75 | N/A | 69 | 2 |
| 2 | 2 | 230 | 322.1 | 0.37 | 0.70 | 144 | 76 | 75 | | 61 | 2 |
| 3 | 3 | 500 | 323.4 | 0.35 | 0.70 | 136 | 75 | 75 | | 59 | 2 |
| 4 | 4 | 730 | 324.6 | 0.29 | 0.70 | 135 | 75 | 75 | | 57 | 2 |
| 5 | 5 | 1000 | 325.8 | 0.27 | 0.70 | 149 | 75 | 75 | | 57 | 2 |
| 6 | 6 | 1230 | 327.0 | 0.28 | 0.70 | 142 | 75 | 75 | | 57 | 2 |
| 7 | 7 | 1500 | 328.2 | 0.26 | 0.70 | 136 | 76 | 75 | | 57 | 2 |
| 8 | 8 | 1730 | 329.4 | 0.19 | 0.70 | 149 | 76 | 75 | | 57 | 2 |
| 9 | 9 | 2000 | 330.7 | 0.15 | 0.70 | 141 | 76 | 75 | | 58 | 2 |
| 10 | 10 | 2230 | 331.8 | 0.13 | 0.70 | 135 | 76 | 75 | | 58 | 2 |
| 11 | 11 | 2500 | 333.0 | 0.09 | 0.70 | 151 | 76 | 75 | | 58 | 2 |
| 12 | 12 | 2730 | 334.3 | 0.05 | 0.70 | 145 | 76 | 75 | | 59 | 2 |
| 13 | | | | | | | | | | | |
| 14 | 1 | 30/00 | 335.526 | 0.25 | 0.70 | 138 | 76 | 75 | | 60 | 2 |
| 15 | 2 | 230 | 336.7 | 0.27 | 0.70 | 133 | 79 | 77 | | 74 | 2 |
| 16 | 3 | 500 | 337.9 | 0.27 | 0.70 | 136 | 78 | 77 | | 68 | 2 |
| 17 | 4 | 730 | 339.1 | 0.29 | 0.70 | 147 | 78 | 77 | | 65 | 2 |
| 18 | 5 | 1000 | 340.3 | 0.28 | 0.70 | 136 | 78 | 77 | | 63 | 2 |
| 19 | 6 | 1230 | 341.5 | 0.28 | 0.70 | 135 | 78 | 77 | | 62 | 2 |
| 20 | 7 | 1500 | 342.7 | 0.27 | 0.70 | 146 | 78 | 77 | | 61 | 2 |
| 21 | 8 | 1730 | 344.0 | 0.23 | 0.70 | 143 | 78 | 77 | | 60 | 2 |
| 22 | 9 | 2000 | 345.1 | 0.22 | 0.70 | 137 | 78 | 77 | | 62 | 2 |
| 23 | 10 | 2230 | 346.4 | 0.24 | 0.70 | 154 | 78 | 77 | | 62 | 2 |
| 24 | 11 | 2500 | 347.6 | 0.20 | 0.70 | 147 | 78 | 77 | | 62 | 2 |
| 25 | 12 | 2730 | 348.8 | 0.16 | 0.70 | 141 | 78 | 77 | | 63 | 2 |
| 26 | END | 60/00 | 350.050 | | | | | | | | |
| 27 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 29 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |
| 31 | | | | | | | | | | | |
| 32 | | | | | | | | | | | |
| 33 | | | 29.048 | 0.4800 | 0.7000 | 141.83 | 76.38 | | | | |

COMPLETED 100418 BN

Leak Checks: Sample Train: .005 --> .008 = .003 cfm @ 8 "Hg
Pitot Tubes: High ☐ @ ____ "$H_2O$ || Low ☐ @ ____ "$H_2O$
Pretest: AR  Sample Train ☑  Pitot Tubes ☑

Plant: Westervelt Aliceville, Al
Source: RCO B
Test For: vel. moisture
Test Operators: Shelnutt. Harkins T1

**RUN NO.** 2
Date 10-2-18
Time start 1247 end 1347

Meter Box NT3 y=0.997
Sample Box No. 2
Probe/Pitot 72610-1
Pitot Cp 0.84
Nozzle Dia. N/A
Filter No. N/A

No. Sample Pts. 12x2
Minutes/Pt. 2.5

GAS ANALYSIS: CEM

| | | | |
|---|---|---|---|
| $CO_2$ | | | |
| $O_2$ | | | |
| CO | | | |
| Time | | | |

Notes:

K FACTOR SETUP
ΔH@ 1.76
Meter Temp
$\%H_2O$
Stack Temp.
K Factor

Amb. Temp. °F 86
Bar. Press "Hg 30.11
Static Press. "$H_2O$ -0.18

CONDENSATE: NOTES
init. final 62
SILICA GEL:
init. final

| | TARE | Final |
|---|---|---|
| 1 GS | ~~6~~ 712 | 752 |
| 2 | 750 | 760 |
| GS 3 | ~~657~~ 662 | 661 |
| 4 | 865 | 873 |

| Port Point | Elapsed Time Min/sec | DGM Reading Ft.³ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp. Temp °F | VAC in Hg |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 000 | 350.274 | 0.35 | 0.70 | 146 | 79 | 78 | N/A | 72 | 2 |
| 2 | 230 | 351.3 | 0.34 | 0.70 | 138 | 79 | 78 | | 72 | 2 |
| 3 | 500 | 352.6 | 0.34 | 0.70 | 151 | 80 | 78 | | 70 | 2 |
| 4 | 730 | 353.9 | 0.32 | 0.70 | 147 | 80 | 78 | | 68 | 2 |
| 5 | 1000 | 355.1 | 0.30 | 0.70 | 139 | 80 | 78 | | 68 | 2 |
| 6 | 1230 | 356.3 | 0.32 | 0.70 | 148 | 80 | 78 | | 68 | 2 |
| 7 | 1500 | 357.5 | 0.22 | 0.70 | 154 | 80 | 78 | | 67 | 2 |
| 8 | 1730 | 358.7 | 0.18 | 0.70 | 138 | 80 | 78 | | 67 | 2 |
| 9 | 2000 | 360.0 | 0.17 | 0.70 | 137 | 80 | 78 | | 67 | 2 |
| 10 | 2230 | 361.2 | 0.13 | 0.70 | 154 | 80 | 78 | | 68 | 2 |
| 11 | 2500 | 362.4 | 0.11 | 0.70 | 144 | 80 | 78 | | 68 | 2 |
| 12 | 2730 | 363.6 | 0.08 | 0.70 | 137 | 80 | 78 | | 68 | 2 |
| | | | | | | | | | | |
| 1 | 30/00 | 364.894 | 0.25 | 0.70 | 158 | 80 | 78 | | 67 | 2 |
| 2 | 230 | 366.1 | 0.28 | 0.70 | 145 | 80 | 79 | | 67 | 2 |
| 3 | 500 | 367.3 | 0.29 | 0.70 | 138 | 80 | 79 | | 68 | 2 |
| 4 | 730 | 368.6 | 0.31 | 0.70 | 148 | 80 | 79 | | 68 | 2 |
| 5 | 1000 | 369.7 | 0.31 | 0.70 | 146 | 80 | 79 | | 68 | 2 |
| 6 | 1230 | 371.0 | 0.33 | 0.70 | 145 | 81 | 79 | | 68 | 2 |
| 7 | 1500 | 372.2 | 0.30 | 0.70 | 137 | 80 | 79 | | 68 | 2 |
| 8 | 1730 | 373.4 | 0.27 | 0.70 | 150 | 80 | 79 | | 67 | 2 |
| 9 | 2000 | 374.7 | 0.24 | 0.70 | 146 | 81 | 79 | | 67 | 2 |
| 10 | 2230 | 375.9 | 0.25 | 0.70 | 139 | 81 | 79 | | 67 | 2 |
| 11 | 2500 | 377.2 | 0.22 | 0.70 | 140 | 81 | 79 | | 68 | 2 |
| 12 | 2730 | 378.4 | 0.19 | 0.70 | 138 | 81 | 79 | | 68 | 2 |
| End | 60/00 | 379.657 | | | | | | | | |
| | | 29.383 | 0.4973 | 0.7000 | 144.29 ~~143.88~~ BN | | 79.29 | | | |

Leak Checks: Sample Train: .094 → .095 = .001 cfm @ 7 "Hg
Pitot Tubes: High ☐ @ ___ "$H_2O$ || Low ☐ @ ___ "$H_2O$

Pretest: Sample Train ☑ GS
Pitot Tubes ☐

COMPLETED 100418 BN

Plant: Westervelt — Aliceville, MS
Source: RTO B
Test For: Velocity, Moisture
Test Operators: Shelnutt, Harkins — T1

RUN NO. 3
Date 10-2-18
Time start 1355 end 1553

| | |
|---|---|
| Meter Box | NT34=0.997 |
| Sample Box | No. |
| Probe/Pitot | 72610-1 |
| Pitot Cp | .84 |
| Nozzle Dia. | N/A |
| Filter No. | N/A |
| Amb. Temp. °F | 88 |
| Bar. Press. "Hg | 30.08 |
| Static Press. "$H_2O$ | -0.18 |

No. Sample Pts. 12x2
Minutes/Pt. 2.5

K FACTOR SETUP
ΔH@ 1.76
Meter Temp
% $H_2O$
Stack Temp.
K Factor

GAS ANALYSIS: CEM
$CO_2$
$O_2$
CO
Time

CONDENSATE NOTES 56 ~~58.5~~ BN
init. final
SILICA GEL:
init. final

Notes:
Down 1400
up 1457

| Tare | Final |
|---|---|
| 1 758.5 | 794.5 |
| 2 639 | 644 |
| 3 663.5 | 665.5 |
| 4 892 | 899 |

| Port Point | Elapsed Time Min:sec | DGM Reading $Ft^3$ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp. Temp °F | VAC in Hg |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 000 | 379.812 | 0.34 | 0.70 | 148 | 82 | 79 | N/A | 77 | 2 |
| 2 | 230 | 381.0 | 0.30 | 0.70 | 139 | 81 | 79 | | 72 | 2 |
| 3 | 500 | 382.3 | 0.35 | 0.70 | 159 | 81 | 79 | | 70 | 2 |
| 4 | 730 | 383.5 | 0.33 | 0.70 | 137 | 83 | 80 | | 74 | 2 |
| 5 | 1000 | 384.7 | 0.32 | 0.70 | 143 | 83 | 80 | | 69 | 2 |
| 6 | 1230 | 386.0 | 0.31 | 0.70 | 158 | 82 | 80 | | 61 | 2 |
| 7 | 1500 | 387.2 | 0.23 | 0.70 | 137 | 82 | 80 | | 61 | 2 |
| 8 | 1730 | 388.4 | 0.19 | 0.70 | 148 | 82 | 80 | | 58 | 2 |
| 9 | 2000 | 389.6 | 0.15 | 0.70 | 156 | 83 | 80 | | 57 | 2 |
| 10 | 2230 | 390.9 | 0.13 | 0.70 | 139 | 82 | 81 | | 58 | 2 |
| 11 | 2500 | 392.1 | 0.13 | 0.70 | 138 | 83 | 81 | | 59 | 2 |
| 12 | 2730 | 393.3 | 0.10 | 0.70 | 161 | 82 | 81 | | 59 | 2 |
| | | | | | | | | | | |
| 1 | 30/00 | 394.601 | 0.26 | 0.70 | 143 | 82 | 81 | | 61 | 2 |
| 2 | 230 | 395.8 | 0.28 | 0.70 | 139 | 82 | 81 | | 62 | 2 |
| 3 | 500 | 397.0 | 0.32 | 0.70 | 149 | 82 | 81 | | 62 | 2 |
| 4 | 730 | 398.2 | 0.34 | 0.70 | 146 | 82 | 81 | | 62 | 2 |
| 5 | 1000 | 399.5 | 0.35 | 0.70 | 140 | 82 | 81 | | 62 | 2 |
| 6 | 1230 | 400.7 | 0.37 | 0.70 | 138 | 82 | 81 | | 62 | 2 |
| 7 | 1500 | 401.9 | 0.28 | 0.70 | 149 | 82 | 81 | | 62 | 2 |
| 8 | 1730 | 403.2 | 0.21 | 0.70 | 151 | 82 | 81 | | 62 | 2 |
| 9 | 2000 | 404.4 | 0.21 | 0.70 | 137 | 82 | 81 | | 62 | 2 |
| 10 | 2230 | 405.6 | 0.20 | 0.70 | 152 | 82 | 81 | | 63 | 2 |
| 11 | 2500 | 406.8 | 0.19 | 0.70 | 150 | 82 | 81 | | 63 | 2 |
| 12 | 2730 | 408.3 | 0.18 | 0.70 | 140 | 82 | 81 | | 63 | 2 |
| end | 60/00 | 409.702 | | | | | | | | |
| | | 29.890 | 0.4958 | 0.7000 | 145.71 | ~~81.25~~ BN 81.29 | | | | |

COMPLETED 100418 BN

Leak Checks: Sample Train: .040 - .043 = .003 cfm @ 7 "Hg
Pitot Tubes: High ✓ @ 4.9 "$H_2O$ Low ✓ @ 4.8 "$H_2O$
Pretest: Sample Train ✓ GS Pitot Tubes ☐

## STACK CONFIGURATION AND SAMPLE POINT LAYOUT (EML V-0 Effective 093013)

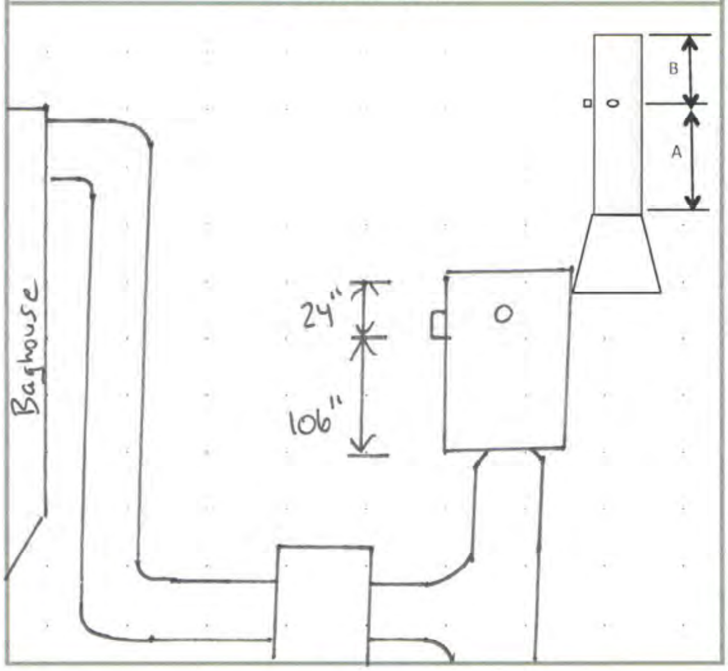
**PLANT:** Westervelt Aliceville, AL **Date:** 10-3-18

**SOURCE:** pellet baghouse

**TEST FOR:** velocity & moisture

**TEST OPERATORS:** Shelnutt T1

### SKETCH OF STACK




### PERCENT OF DIAMETER (for circular stacks)

| point no. | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|
| 1 | 14.6 | 6.7 | 4.4 | 3.2 | 2.6 | 2.1 | 1.8 | 1.6 |
| 2 | 85.4 | 25.0 | 14.6 | 10.5 | 8.2 | 6.7 | 5.7 | 4.9 |
| 3 | | 75.0 | 29.6 | 19.4 | 14.6 | 11.8 | 9.9 | 8.5 |
| 4 | | 93.3 | 70.4 | 32.3 | 22.6 | 17.7 | 14.6 | 12.5 |
| 5 | | | 85.4 | 67.7 | 34.2 | 25.0 | 20.1 | 16.9 |
| 6 | | | 95.6 | 80.6 | 65.8 | 35.6 | 26.9 | 22.0 |
| 7 | | | | 89.5 | 77.4 | 64.4 | 36.6 | 28.3 |
| 8 | | | | 96.8 | 85.4 | 75.0 | 63.4 | 37.5 |
| 9 | | | | | 91.8 | 82.3 | 73.1 | 62.5 |
| 10 | | | | | 97.4 | 88.2 | 79.9 | 71.7 |
| 11 | | | | | | 93.3 | 85.4 | 78.0 |
| 12 | | | | | | 97.9 | 90.1 | 83.1 |
| 13 | | | | | | | 94.3 | 87.5 |
| 14 | | | | | | | 98.2 | 91.5 |
| 15 | | | | | | | | 95.1 |
| 16 | | | | | | | | 98.4 |

| Point No. | inches from wall | velocity head Cosk | cost |
|---|---|---|---|
| 1 | 1.1 | 2 | 3 |
| 2 | 3.6 | 3 | 4 |
| 3 | 6.4 | 2 | 2 |
| 4 | 9.9 | 0 | 0 |
| 5 | 15.0 | 0 | 1 |
| 6 | 29.0 | 0 | 0 |
| 7 | 34.1 | 0 | 0 |
| 8 | 37.6 | 4 | 5 |
| 9 | 40.4 | 3 | 4 |
| 10 | 42.9 | 5 | 4 |

**STACK DIAMETER:** 44.0"

Distance from ports to disturbance:

- A. to upstream disturbance: 106"
- B. to downstream disturbance: 24"

Upstream diameters: 2.4

Downstream diameters: 0.5

Minimum No. sample points required: 16

No. sample points selected: 10 x 2

Port Length: 1.75"

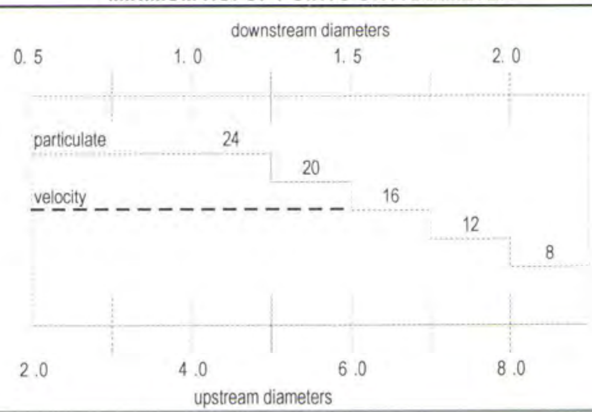
Port Type: 3" pipe nipple

Port Access: Manlift & board

Pitot ID 06216-05 Pitot Cp: 0.84 Stack Temp:

Remarks:

### MINIMUM NO. OF POINTS ON A DIAMETER



T1

Plant: Westervelt — Aliceville, AL
Source: Pellet cooler Baghouse
Test For: Velocity - Moisture
Test Operators: Shelnutt · Harkins — T1

**RUN NO.** 1
Date 10-3-18
Time start 0747 end 0953

| | |
|---|---|
| Meter Box | NT34=.997 |
| Sample Box | No. |
| Probe/Pitot | 624165 |
| Pitot Cp | .84 |
| Nozzle Dia. | NA |
| Filter No. | NA |
| Amb. Temp. °F | 72 |
| Bar. Press. "Hg | 30.06 |
| Static Press. "$H_2O$ | -0.56 |

No. Sample Pts. 10x2
Minutes/Pt. 3.0

K FACTOR SETUP
ΔH@ 1.76
Meter Temp
%$H_2O$
Stack Temp.
K Factor

GAS ANALYSIS: CEM

| | | | |
|---|---|---|---|
| $CO_2$ | | | |
| $O_2$ | | | |
| CO | | | |
| Time | | | |

CONDENSATE: init. notes final 28
SILICA GEL: init. final

Notes:
DOWN 0823
UP 0929

| | Tare | Final |
|---|---|---|
| 1) | 761 | 781 |
| 2) | 641 | 643 |
| 3) | 656 | 656.5 |
| 4) | 873 | 878.5 |

| Port Point | Elapsed Time Min/sec | DGM Reading $Ft^3$ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp. Temp °F | VAC in Hg |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0/0 | 410.100 | 0.90 | 0.70 | 116 | 75 | 74 | N/A | 71 | 2 |
| 2 | 3 | 411.3 | 0.83 | 0.70 | 116 | 75 | 74 | | 54 | 2 |
| 3 | 6 | 413.0 | 0.73 | 0.70 | 116 | 75 | 74 | | 54 | 2 |
| 4 | 9 | 414.5 | 0.70 | 0.70 | 116 | 75 | 74 | | 55 | 2 |
| 5 | 12 | 415.9 | 0.68 | 0.70 | 117 | 75 | 74 | | 54 | 2 |
| 6 | 15 | 417.3 | 0.49 | 0.70 | 116 | 75 | 74 | | 55 | 2 |
| 7 | 18 | 418.6 | 0.62 | 0.70 | 117 | 76 | 75 | | 57 | 2 |
| 8 | 21 | 420.0 | 0.83 | 0.70 | 117 | 76 | 75 | | 59 | 2 |
| 9 | 24 | 421.5 | 0.64 | 0.70 | 116 | 76 | 75 | | 58 | 2 |
| 10 | 27 | 423.0 | 0.41 | 0.70 | 117 | 76 | 75 | | 59 | 2 |
| 1 | 30/0 | 424.413 | 0.83 | 0.70 | 117 | 76 | 75 | | 59 | 2 |
| 2 | 3 | 425.9 | 1.20 | 0.70 | 117 | 76 | 75 | | 59 | 2 |
| 3 | 6 | 427.3 | 1.05 | 0.70 | 116 | 77 | 75 | | 59 | 2 |
| 4 | 9 | 428.8 | 0.94 | 0.70 | 122 | 78 | 77 | | 73 | 2 |
| 5 | 12 | 430.3 | 0.71 | 0.70 | 122 | 78 | 77 | | 68 | 2 |
| 6 | 15 | 431.7 | 0.96 | 0.70 | 123 | 78 | 77 | | 66 | 2 |
| 7 | 18 | 433.2 | 1.15 | 0.70 | 123 | 79 | 77 | | 66 | 2 |
| 8 | 21 | 434.6 | 1.40 | 0.70 | 123 | 79 | 77 | | 66 | 2 |
| 9 | 24 | 436.2 | 1.45 | 0.70 | 123 | 79 | 77 | | 66 | 2 |
| 10 | 27 | 437.7 | 1.20 | 0.70 | 124 | 79 | 78 | | 66 | 2 |
| END | 60/0 | 439.180 | | | | | | | | |
| | | 29.080 | 0.9296 | 0.7000 | 118.70 / ~~118.92~~ | 76.05 / ~~76.04~~ | | | | |

COMPLETED 100418 BN

Leak Checks: Sample Train: .026 — .027 = .001 cfm @ 7 "Hg
Pitot Tubes: High ☐ @ "$H_2O$ // Low ☐ @ "$H_2O$
Pretest: OK Sample Train ✓ Pitot Tubes ✓

| | | | |
|---|---|---|---|
| Plant: Westervelt | Aliceville, AL | RUN NO. | 2 |
| Source: Pellet Cooler Baghouse | | Date | 10-3-18 |
| Test For: Velocity · Moisture | | Time start 1000 | end 1100 |
| Test Operators: Shelnutt · Harkins | TI | | |

| | |
|---|---|
| Meter Box | NT34.997 |
| Sample Box | No. |
| Probe Pitot | 624165 |
| Pitot Cp | .84 |
| Nozzle Dia. | N/A |
| Filter No. | N/A |
| Amb. Temp. °F | 81 |
| Bar. Press. "Hg | 30.06 |
| Static Press. "$H_2O$ | -0.56 |

| | |
|---|---|
| No. Sample Pts. | 10x2 |
| Minutes/Pt. | 3.0 |
| **K FACTOR SETUP** | |
| ΔH@ | 1.76 |
| Meter Temp | |
| %$H_2O$ | |
| Stack Temp. | |
| K Factor | |

GAS ANALYSIS: CEM

| | | | |
|---|---|---|---|
| $CO_2$ | | | |
| $O_2$ | | | |
| CO | | | |
| Time | | | |

CONDENSATE: init. Water final 38

SILICA GEL: init. final

Notes:

| | Tare | Final |
|---|---|---|
| 1) | 750 | 778 |
| 2) | 756 | 758.5 |
| 3) | 608 | 610 |
| 4) | 860 | 865.5 |

| Port Point | Elapsed Time Min/sec | DGM Reading Ft.³ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp. Temp °F | Vac in. Hg |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 00 | 439.552 | 0.80 | 0.70 | 127 | 81 | 78 | N/A | 78 | 2 |
| 2 | 3 | 441.0 | 1.10 | 0.70 | 127 | 81 | 78 | | 73 | 2 |
| 3 | 6 | 442.4 | 1.00 | 0.70 | 127 | 81 | 78 | | 72 | 2 |
| 4 | 9 | 443.9 | 0.87 | 0.70 | 126 | 81 | 78 | | 70 | 2 |
| 5 | 12 | 445.4 | 0.68 | 0.70 | 127 | 81 | 79 | | 70 | 2 |
| 6 | 15 | 446.9 | 0.90 | 0.70 | 126 | 81 | 79 | | 68 | 2 |
| 7 | 18 | 448.4 | 1.15 | 0.70 | 126 | 81 | 79 | | 68 | 2 |
| 8 | 21 | 449.8 | 1.40 | 0.70 | 126 | 81 | 79 | | 68 | 2 |
| 9 | 24 | 451.3 | 1.10 | 0.70 | 126 | 80 | 79 | | 67 | 2 |
| 10 | 27 | 452.8 | 1.00 | 0.70 | 125 | 80 | 79 | | 67 | 2 |
| | | | | | | | | | | |
| 1 | 30/00 | 454.324 | 0.86 | 0.70 | 126 | 80 | 79 | | 68 | 2 |
| 2 | 3 | 455.8 | 0.83 | 0.70 | 125 | 80 | 79 | | 66 | 2 |
| 3 | 6 | 457.2 | 0.81 | 0.70 | 125 | 80 | 79 | | 64 | 2 |
| 4 | 9 | 458.7 | 0.73 | 0.70 | 126 | 80 | 79 | | 63 | 2 |
| 5 | 12 | 460.2 | 0.71 | 0.70 | 126 | 80 | 79 | | 63 | 2 |
| 6 | 15 | 461.7 | 0.45 | 0.70 | 126 | 80 | 79 | | 63 | 2 |
| 7 | 18 | 463.2 | 0.62 | 0.70 | 127 | 80 | 79 | | 63 | 2 |
| 8 | 21 | 464.6 | 0.80 | 0.70 | 128 | 80 | 79 | | 61 | 2 |
| 9 | 24 | 466.1 | 0.65 | 0.70 | 128 | 80 | 79 | | 62 | 2 |
| 10 | 27 | 467.5 | 0.40 | 0.70 | 127 | 80 | 79 | | 62 | 2 |
| END | 60/00 | 469.037 | | | | | | | | |
| | | 29.485 | 0.9090 | 0.7000 | 126.35 | | 79.60 | | | |

COMPLETED 100418 BN

Leak Checks: Sample Train: .052 → .053 = .001 cfm @ 7 "Hg — Pitot Tubes: High □ @ "$H_2O$ Low □ @ "$H_2O$

Pretest: Sample Train ☑ GS — Pitot Tubes □

Plant: Westervelt  Aliceville, AL

Source: Pellet Cooler Baghouse

Test For: Velocity, Moisture

Test Operators: Shelnutt, Harkins  T1

**RUN NO.** 3

Date 10-3-18

Time start 1109 end 1209

| | |
|---|---|
| Meter Box | NT3 y=.997 |
| Sample Box | No. |
| Probe Pitot | 624165 |
| Pitot Cp | .84 |
| Nozzle Dia. | N/A |
| Filter No. | N/A |
| Amb. Temp. °F | 85 |
| Bar. Press "Hg | 30.06 |
| Static Press. "$H_2O$ | -0.56 |

| | |
|---|---|
| No. Sample Pts. | 10x2 |
| Minutes/Pt. | 3.0 |

K FACTOR SETUP

| | |
|---|---|
| ΔH@ | 1.76 |
| Meter Temp | |
| %$H_2O$ | |
| Stack Temp. | |
| K Factor | |

GAS ANALYSIS: CEM

| | | | |
|---|---|---|---|
| $CO_2$ | | | |
| $O_2$ | | | |
| CO | | | |
| Time | | | |

CONDENSATE: NOTES  init. ____ final 30.5

SILICA GEL: init. ____ final ____

Notes:

| | Tare | Final |
|---|---|---|
| 1) | 763 | 784.5 |
| 2) | 639 | 641 |
| 3) | 653.5 | 654.5 |
| 4) | 878.5 | 884.5 |

| Port Point | Elapsed Time Min sec | DGM Reading Ft.³ | Velocity Head ΔP in. $H_2O$ | Orifice ΔH in. $H_2O$ | Stack Temp °F | Meter Temp °F in | Meter Temp °F out | Oven Temp °F | Imp. Temp °F | Vac in Hg |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 000 | 469.320 | 0.80 | 0.70 | 131 | 81 | 79 | N/A | 80 | 2 |
| 2 | 3 | 470.7 | 0.97 | 0.70 | 131 | 81 | 79 | | 75 | 2 |
| 3 | 6 | 472.2 | 1.10 | 0.70 | 131 | 81 | 79 | | 72 | 2 |
| 4 | 9 | 473.8 | 0.92 | 0.70 | 132 | 81 | 79 | | 70 | 2 |
| 5 | 12 | 475.2 | 0.73 | 0.70 | 132 | 81 | 79 | | 68 | 2 |
| 6 | 15 | 476.6 | 0.86 | 0.70 | 132 | 81 | 79 | | 67 | 2 |
| 7 | 18 | 478.1 | 1.20 | 0.70 | 132 | 81 | 79 | | 66 | 2 |
| 8 | 21 | 479.6 | 1.35 | 0.70 | 131 | 82 | 80 | | 63 | 2 |
| 9 | 24 | 481.2 | 1.20 | 0.70 | 132 | 82 | 80 | | 62 | 2 |
| 10 | 27 | 482.7 | 1.15 | 0.70 | 132 | 82 | 80 | | 60 | 2 |
| | | | | | | | | | | |
| 1 | 30/00 | 484.219 | 0.86 | 0.70 | 132 | 82 | 80 | | 61 | 2 |
| 2 | 3 | 485.6 | 0.81 | 0.70 | 132 | 82 | 80 | | 61 | 2 |
| 3 | 6 | 487.1 | 0.69 | 0.70 | 132 | 82 | 80 | | 62 | 2 |
| 4 | 9 | 488.5 | 0.66 | 0.70 | 132 | 82 | 80 | | 62 | 2 |
| 5 | 12 | 490.1 | 0.65 | 0.70 | 132 | 82 | 80 | | 63 | 2 |
| 6 | 15 | 491.6 | 0.42 | 0.70 | 132 | 82 | 80 | | 63 | 2 |
| 7 | 18 | 493.0 | 0.55 | 0.70 | 133 | 82 | 80 | | 63 | 2 |
| 8 | 21 | 494.5 | 0.75 | 0.70 | 134 | 82 | 80 | | 63 | 2 |
| 9 | 24 | 496.0 | 0.57 | 0.70 | 133 | 82 | 80 | | 64 | 2 |
| 10 | 27 | 497.5 | 0.38 | 0.70 | 133 | 82 | 80 | | 64 | 2 |
| END | 64/00 | 498.997 | | | | | | | | |
| | | 29.677 | 0.8999 | 0.7000 | 132.05 | | 80.65 | | | |

COMPLETED 100418BN

Leak Checks: Sample Train: .078 → .080 = .002 cfm @ 9 "Hg
Pitot Tubes: High ✓ @ 6.0 "$H_2O$  Low ✓ @ 4.2 "$H_2O$

Pretest: Sample Train ✓ GS  Pitot Tubes

# *APPENDIX B*

# *CALIBRATION DATA*

ANALYZER CALIBRATION RECORD (EML V-0 Effective 093013)

| | | | |
|---|---|---|---|
| Plant | Westervelt | Aliceville, AL | DATE 10.2.18 |
| Source | 280 B | | |
| Test For | VOC | | |
| Operators | Slowatt | | |

| Analyte, units / Analyzer ID / Span / DAQ Channel | Level | Cal. Value | Cyl. Ref. | Diluted Y/N | Cal. Reading | Bias | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Start | 0922 | 1247 | 1355 |
| | | | | | | End | 1236 | 1347 | |
| % $CO_2$ | Zero | 0.0 | $N_2$ | N | 0.0 | 0.1 | | | |
| 14150 3053 | Low | | | | | | | | |
| 10.0 | Mid | 5.0 | 1 | Y | 5.0 | ~~5.0~~ 5.1 | | | |
| 2 | High | 10.0 | 1 | Y | 10.0 | | | | |
| % $O_2$ | Zero | 0.0 | $N_2$ | N | 0.0 | 0.1 | | | |
| 14200 3053 | Low | | | | | | | | |
| 20.9 | Mid | 10.5 | 1 | Y | 10.5 | 10.4 | | | |
| 3 | High | 20.9 | Air | N | 20.8 | | | | |
| ppmw $C_3H_8$ | Zero | 0.0 | Air | N | | 0.0 | -.2 | -.2 | -.2 |
| SICHT 06181 1715 | Low | 24.0 | 2 | Y | | 24.0 | 23.4 | 23.5 | 23.6 |
| 80 | Mid | 40.0 | 2 | Y | | 40.1 | | | |
| 8 | High | 64.0 | 2 | Y | | 63.9 | | | |
| | Zero | | | | | | | | |
| | Low | | | | | | | | |
| | Mid | | | | | | | | |
| | High | | | | | | | | |
| | Zero | | | | | | | | |
| | Low | | | | | | | | |
| | Mid | | | | | | | | |
| | High | | | | | | | | |
| | Zero | | | | | | | | |
| | Low | | | | | | | | |
| | Mid | | | | | | | | |
| | High | | | | | | | | |

| Cylinder Ref. | Cylinder No. | Contents | Expiration Date | Notes: |
|---|---|---|---|---|
| 1 | CC168917 | $SO_2$ 20.2 $CO_2$ 20.1 | 4.10.26 | response time 1 min |
| 2 | CC103399 | $C_3H_8$ 399 | 8.8.25 | |
| | | | | |
| | | | | |
| | | | | |

Analyst's signature: [signature]

Method Specifications:

| Methods 3A, 6C, 7E | Method 25A |
|---|---|
| Zero < 20 % of span (can be zero) | Zero < 0.1 % of span |
| Mid = 40 to 60 % of span | Low = 25 to 35 % of span |
| High = span | Mid = 45 to 60 % of span |
| | High = 80 to 90 % of span |

Error Specifications:

| | | |
|---|---|---|
| Calibration Error Allowable | < 2% of span | [((Cyl. Value - Reading) / span)* 100%] |
| 25A Calibration Error Allowable | < 5% Cyl. Value | [(Cyl. Value - Reading) / (Cyl Value) *100%] |
| System Bias | < 5% span (not for 20 & 25A) | [(System Cal - Reading)/span*100] |
| Drift | < 3% | [(Initial System Cal. - Final System Cal.) / Span * 100%] |
| Method 20 Drift | < 2% | [(initial system cal. - final system cal.) / Span * 100%] |

METHOD 205 - VERIFICATION OF GAS DILUTION SYSTEMS (EML V-0 Effective 093013)

DATE: 10-1-18

PROJECT: Westervelt Aliceville, AL

ANALYST: G. Shelnutt SIGNATURE: [signature]

**DILUTION SYSTEM**

| | |
|---|---|
| MAKE | Environics |
| MODEL | 4040/3616 |
| NO. OF DIL. DEVICES | 4 |
| TYPE OF DIL. DEVICE | MFC |

**REFERENCE MONITOR**

| | |
|---|---|
| TYPE | % O2 |
| MAKE | Servomex |
| MODEL | 1420D/3053 |
| SPAN | 20.9 |

| | | | |
|---|---|---|---|
| HIGH LEVEL SUPPLY GAS CONC. | 20.9% | CYLINDER ID | Zero Air |
| MID LEVEL SUPPLY GAS CONC. | 10.55% | CYLINDER ID | XC025858B |
| DILUTION GAS | 0.0 | CYLINDER ID | Zero N2 |

| MFC No. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Target Value | 10.5 | 5.2 | | | | | | | | |

**Injections** **(Triplicate injection of 2 dilutions per MFC to be used)**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1st | 10.5 | 5.2 | | | | | | | | |
| 2nd | 10.5 | 5.2 | | | | | | | | |
| 3rd | 10.5 | 5.2 | | | | | | | | |
| Average | 10.5 | 5.2 | | | | | | | | |

**% Difference = (( target conc. - Avg. conc.)/target conc.)*100** **Must be within 2% of avg.**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1st inject | 0.0 | 0.0 | | | | | | | | |
| 2nd inject | 0.0 | 0.0 | | | | | | | | |
| 3rd inject | 0.0 | 0.0 | | | | | | | | |

**Triplicate injection of Mid Level Gas to Reference Monitor. Must be within 10% of one dilution**

| | Response | % Difference |
|---|---|---|
| 1st | 10.5 | 0.0 |
| 2nd | 10.5 | 0.0 |
| 3rd | 10.5 | 0.0 |
| Average | 10.5 | 0.0 |

Average must be within +/- 2% of the certified gas concentration.

PITOT TUBE GEOMETRY CALIBRATION (EML V-0 Effective 093013) T1

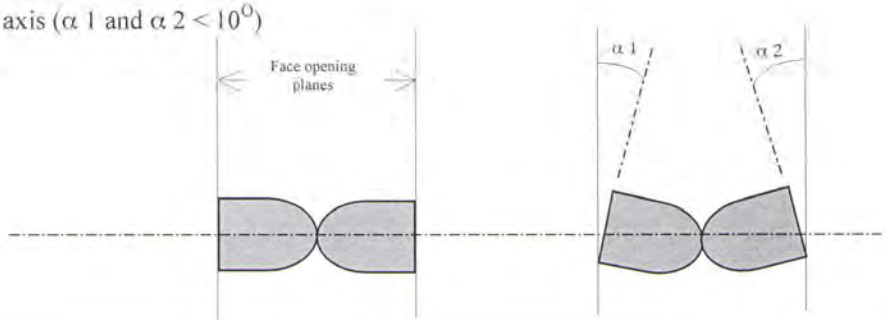
Pitot tube/probe identification: 72610-1 Date Checked: 10-2-18 By: GS

I. Pitot tubes having the following geometric characteristics are assigned a pitot tube coefficient of 0.84.

1. Face openings perpendicular to transverse axis ($\alpha$ 1 and $\alpha$ 2 < $10^{O}$)

$\alpha$ 1 = 0

$\alpha$ 2 = 1

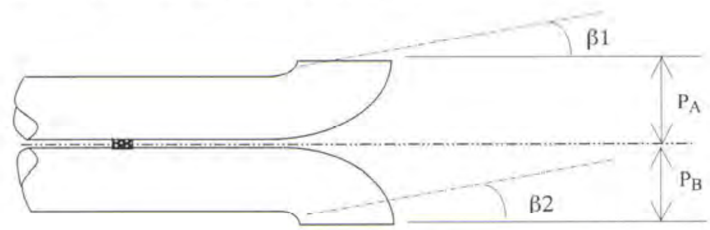



2. Face openings parallel to longitudinal axis: ($\beta$1 and $\beta$2 < $5^{O}$; P = 1.05 $D_t$ to 1.50 $D_t$; $P_A$ = $P_B$

Dt = 0.250 $\beta$1 = 1

$P_A$ = 0.368 $\beta$2 = 2

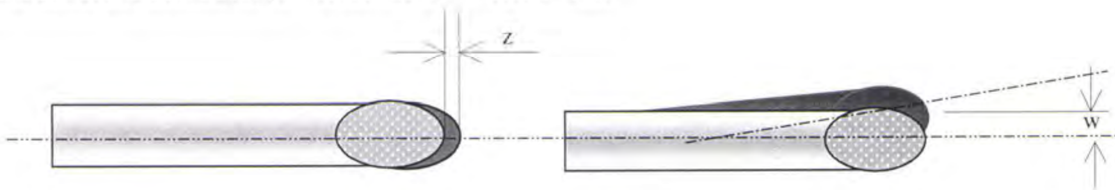
$P_B$ = 0.368




3. Both legs equal in length and centerline coincident (z < 0.125 inch; w < 0.031 inch)

z = 0.013

w = 0




PITOT/PROBE CLEARANCE CHECK:

Nozzle ID: N/A Nozzle diameter: N/A Date N/A By N/A

II. Pitot/probe/nozzle assemblies have the same Cp as the isolated Pitot tube when the following conditions exist.

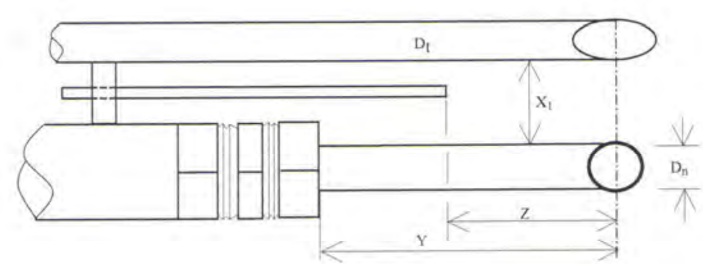
1. $D_t \geq 0.188$ and < 0.375 inch $D_t$ = N/A

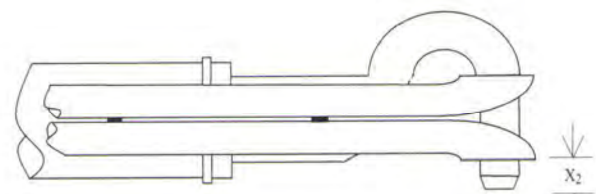
2. $X_1 \geq 0.75$ inch $X_1$ = N/A

3. $X_2 \geq 0$ inch $X_2$ = N/A

4. Y ≥ 3.0 inch Y = N/A

5. Z ≥ 2.0 inch Z = N/A



ANALYZER CALIBRATION RECORD (EML V-0 Effective 093013)

| | | | |
|---|---|---|---|
| Plant | Westervelt Aliceville, AL | DATE | 10-3-18 |
| Source | Pellet Cooler Baghouse | | |
| Test For | VOC | | |
| Operators | Rayburn | | |

| Analyte, units / Analyzer ID / Span / DAQ Channel | Level | Cal. Value | Cyl. Ref. | Diluted Y/N | Cal. Reading |
|---|---|---|---|---|---|
| ppmw $C_3H_8$ | Zero | 0 | Air | N | |
| SIC 0618117185 | Low | 60 | 1 | Y | |
| 200 | Mid | 100 | 1 | Y | |
| 8 | High | 160 | 1 | Y | |
| | Zero | | | | |
| | Low | | | | |
| | Mid | | | | |
| | High | | | | |
| | Zero | | | | |
| | Low | | | | |
| | Mid | | | | |
| | High | | | | |
| | Zero | | | | |
| | Low | | | | |
| | Mid | | | | |
| | High | | | | |
| | Zero | | | | |
| | Low | | | | |
| | Mid | | | | |
| | High | | | | |
| | Zero | | | | |
| | Low | | | | |
| | Mid | | | | |
| | High | | | | |

| | | | |
|---|---|---|---|
| Start | 0747 | 1000 | 1109 |
| End | 0953 | 1100 | 1209 |
| Run / Bias | 1 | 2 | 3 |
| 0 | 1 | 1 | 1 |
| 58 | | | |
| 99 | 99 | 100 | 99 |
| 162 | | | |

| Cylinder Ref. | Cylinder No. | Contents | Expiration Date | Notes: |
|---|---|---|---|---|
| 1 | CC103399 | $C_3H_8$ 399. | 08-08-25 | response time = 1 min |

Analyst's signature: [signature]

Method Specifications:

**Methods 3A, 6C, 7E**
Zero < 20 % of span (can be zero)
Mid = 40 to 60 % of span
High = span

Method 25A
Zero < 0.1 % of span
Low = 25 to 35 % of span
Mid = 45 to 60 % of span
High = 80 to 90 % of span

Error Specifications:

| | | |
|---|---|---|
| Calibration Error Allowable | < 2% of span | [((Cyl. Value - Reading) / span)* 100%] |
| 25A Calibration Error Allowable | < 5% Cyl. Value | [(Cyl. Value - Reading) / (Cyl Value) *100%] |
| System Bias | < 5% span (not for 20 & 25A) | [(System Cal - Reading)/span*100] |
| Drift | < 3% | [(Initial System Cal. - Final System Cal.) / Span * 100%] |
| Method 20 Drift | < 2% | [(initial system cal. - final system cal.) / Span * 100%] |

# PITOT TUBE GEOMETRY CALIBRATION

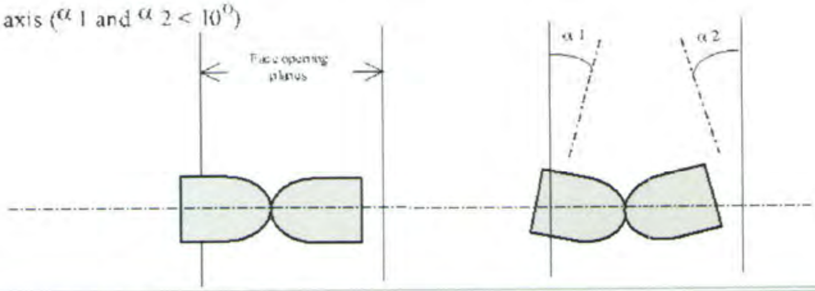
Pitot tube/probe identification: 06 2416 5 Date Checked: 10·3·18 By: OR

I. Pitot tubes having the following geometric characteristics are assigned a pitot tube coefficient of 0.84.

1. Face openings perpendicular to transverse axis ($\alpha$1 and $\alpha$2 < 10°)

$\alpha$1 – Ø

$\alpha$2 – Ø

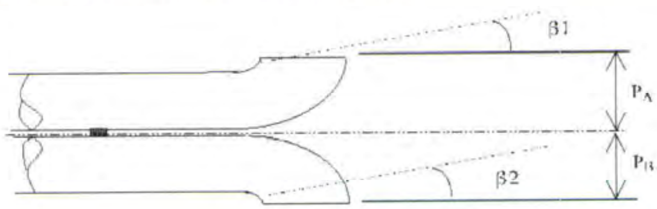



2. Face openings parallel to longitudinal axis: ($\beta$1 and $\beta$2 < 5°; P – 1.05 $D_t$ to 1.50 $D_t$; $P_A$ – $P_B$

Dt – 0.378 $\beta$1 – 1

$P_A$ – 0.482 $\beta$2 – 0

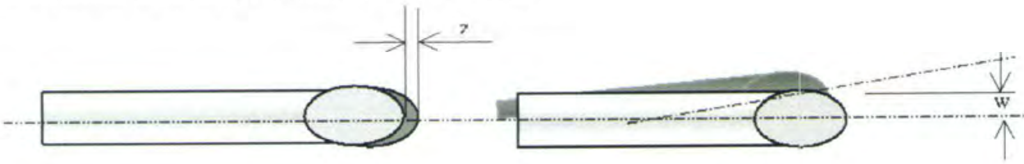
$P_B$ – 0.482




3. Both legs equal in length and centerline coincident (z < 0.125 inch; w < 0.031 inch)

z – Ø

w – Ø

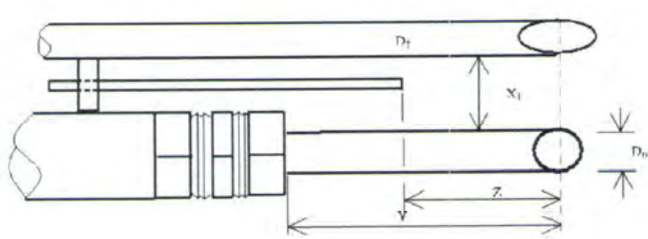


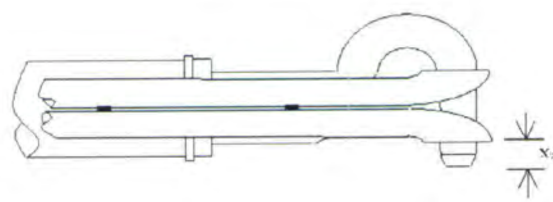

PITOT/PROBE CLEARANCE CHECK:

Nozzle ID: N/A Nozzle diameter: N/A Date N/A By N/A

II. Pitot/probe/nozzle assemblies have the same Cp as the isolated Pitot tube when the following conditions exist.

1. $D_t \geq 0.188$ and $< 0.375$ inch $D_t$ – N/A
2. $X_1 \geq 0.75$ inch $X_1$ – N/A
3. $X_2 \geq 0$ inch $X_2$ – N/A
4. $Y \geq 3.0$ inch Y – N/A
5. $Z \geq 2.0$ inch Z – N/A



# THERMOCOUPLE CALIBRATION

DATE/PLANT: 10.3.18 Westervelt Aliceville AL BY: OR

REFERENCE THERMOMETER: ~~omega CL3512A SN338~~ Omega CL3512A S/N 487

All thermocouple devices used are all originally calibrated against a NIST traceable voltage source by the manufacturer.

After or during each test series, the accuracy of each thermocouple system is checked at ambient or room temperature against an ASTM reference thermometer. Those temperatures are to agree within +/- 2° F. Thermocouple continuity and proper junction location is checked by subjecting the thermocouple to a change in temperature.

| Field Thermocouple | Reference Temp. °F | T'couple Temp. °F | continuity/junction check |
|---|---|---|---|
| C82196 cond. temp | 129 | 131 | ✓ |
| 120216027-26 stack | 63 | 65 | ✓ |
| 120216043 NT3 meter in | 82 | 80 | ✓ |
| 120216044 NT3 meter out | 79 | 79 | ✓ |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# DRY GAS METER CALIBRATION
## By Critical Orifice

| | | | |
|---|---|---|---|
| **Meter ID** | NT3 2962160 | **Date** | 10/04/18 |
| **Orifice ID** | 1312 | **By** | GS |
| **T, Amb** | 76 | **Pbar** | 29.90 |

| Orifice | | | ΔH | VAC | Time | Meter | | | | | | Vmstd | Vcrstd | Y | ΔH@ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | K' | Q' | in. | in. | min. | Vi | Vf | Temp. in | | Temp out | | | | | |
| | | cfm | $H_2O$ | Hg | | $ft^3$ | $ft^3$ | init. | final | init. | final | | | | |
| 17 | 0.4391 | 0.58 | 1.10 | 21.0 | 9.00 | 521.927 | 527.327 | 82 | 82 | 81 | 81 | 5.261 | 5.139 | 0.977 | 1.839 |
| 23 | 0.6091 | 0.80 | 2.10 | 19.0 | 7.00 | 527.326 | 533.076 | 82 | 82 | 81 | 81 | 5.603 | 5.513 | 0.984 | 1.841 |
| 26 | 0.6905 | 0.92 | 2.65 | 18.0 | 6.00 | 533.076 | 538.678 | 82 | 83 | 81 | 81 | 5.456 | 5.434 | 0.996 | 1.755 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 0.986 | 1.81 |

Calculations:

Vm = [Vf-Vi]
Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]
Vcrstd = K'[(Pbar)(θ)/(T,amb)]
Y = [(Vcrstd/Vmstd)]
Q = [(Vm/θ)(Tm out/Tm)(Y)]
K = [Q(√((Pm Mm)/((Tm out)( ΔH))]
ΔH@ = [0.921/$K^2$]

*Where:*

Pbar = Barometric pressure; in. Hg
Tm = Average Temp. at meter, $^oR$
Pm = Meter pressure, (Pbar + ΔH/13.6); in. Hg
Mm = molecular weight of air (29)
Y = Meter correction factor; dimensionless

# DRY GAS METER CALIBRATION
## By Critical Orifice

**Meter ID** Nutech 3 2962160 **Date** 06/01/18

**Orifice ID** 1312 **By** Shelnutt

**T, Amb** 79 **Pbar** 29.80

| Orifice | | | ΔH | VAC | Time | Meter | | | | | | Vmstd | Vcrstd | Y | ΔH@ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | K' | Q' | in. | in. | min. | Vi | Vf | Temp. in | | Temp out | | | | | |
| | | cfm | $H_2O$ | Hg | | $ft^3$ | $ft^3$ | init. | final | init. | final | | | | |
| 12 | 0.3169 | 0.42 | 0.50 | 22 | 13.00 | 696.128 | 701.538 | 79 | 77 | 80 | 79 | 5.281 | 5.327 | 1.009 | 1.625 |
| 17 | 0.4391 | 0.58 | 1.00 | 21 | 7.00 | 701.538 | 705.625 | 77 | 75 | 79 | 77 | 4.002 | 3.961 | 0.990 | 1.707 |
| 23 | 0.6091 | 0.80 | 2.15 | 18 | 7.00 | 705.625 | 711.240 | 75 | 75 | 77 | 77 | 5.509 | 5.464 | 0.992 | 1.927 |
| 26 | 0.6905 | 0.92 | 2.60 | 17 | 6.00 | 711.240 | 716.745 | 75 | 76 | 77 | 77 | 5.399 | 5.386 | 0.998 | 1.760 |
| 31 | 0.8293 | 1.10 | 3.75 | 15 | 5.00 | 716.745 | 722.227 | 76 | 76 | 77 | 76 | 5.376 | 5.366 | 0.998 | 1.772 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 0.997 | 1.76 |

Calculations:

Vm = [Vf-Vi]

Vmstd = [(17.64)(Vm)(Pbar+ΔH/13.6)/Tm]

Vcrstd = K'[(Pbar)(θ)/(T,amb)]

Y = [(Vcrstd/Vmstd)]

Q = [(Vm/θ)(Tm out/Tm)(Y)]

K = [Q(sqrt((Pm Mm)/((Tm out)(ΔH))]

ΔH@ = [$0.921/K^2$]

Where:

Pbar = Barometric pressure; in. Hg

Tm = Average Temp. at meter, $^oR$

Pm = Meter pressure, (Pbar + ΔH/13.6); in. Hg

Mm = molecular weight of air (29)

Y = Meter correction factor; dimensionless

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
630 United Drive
Durham, NC 27713
Airgas.com

# CERTIFICATE OF ANALYSIS
## Grade of Product: EPA Protocol

| | | | |
|---|---|---|---|
| Part Number: | E03NI79E15A0030 | Reference Number: | 122-401151785-1B |
| Cylinder Number: | CC168917 | Cylinder Volume: | 156.9 CF |
| Laboratory: | 124 - Durham (SAP) - NC | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B22018 | Valve Outlet: | 660 |
| Gas Code: | CO2,SO2,BALN | Certification Date: | Apr 10, 2018 |

**Expiration Date: Apr 10, 2026**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| SULFUR DIOXIDE | 200.0 PPM | 201.9 PPM | G1 | +/- 0.7% NIST Traceable | 04/03/2018, 04/10/2018 |
| CARBON DIOXIDE | 20.00 % | 20.13 % | G1 | +/- 0.6% NIST Traceable | 04/03/2018 |
| NITROGEN | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 15060606 | CC449754 | 248.1 PPM SULFUR DIOXIDE/NITROGEN | +/- 0.6% | Dec 17, 2020 |
| NTRM | 13060621 | CC413679 | 13.359 % CARBON DIOXIDE/NITROGEN | +/- 0.6% | May 09, 2019 |

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Nicolet 6700 AHR0801549 CO2 | FTIR | Mar 29, 2018 |
| Nicolet 6700 AHR0801549 SO2 | FTIR | Mar 29, 2018 |

**Triad Data Available Upon Request**

Approved for Release

**Airgas Specialty Gases**
Airgas USA, LLC
630 United Drive
Durham, NC 27713
Airgas.com

Airgas
an Air Liquide company

# CERTIFICATE OF ANALYSIS
## Grade of Product: EPA Protocol

| | | | |
|---|---|---|---|
| Part Number: | E02AI99E15A0484 | Reference Number: | 122-400969212-1 |
| Cylinder Number: | CC103399 | Cylinder Volume: | 146.3 CF |
| Laboratory: | 124 - Durham (SAP) - NC | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B22017 | Valve Outlet: | 590 |
| Gas Code: | PPN,BALA | Certification Date: | Aug 08, 2017 |

**Expiration Date: Aug 08, 2025**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| PROPANE | 400.0 PPM | 399.3 PPM | G1 | +/- 0.9% NIST Traceable | 08/08/2017 |
| AIR | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 08061109 | CC262318 | 249.1 PPM PROPANE/AIR | +/- 0.6% | Jun 22, 2018 |

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Nicolet 6700 AHR0801333 C3H8 | FTIR | Jul 26, 2017 |

**Triad Data Available Upon Request**

Signature on file

**Approved for Release**

**Airgas Specialty Gases**
Airgas USA, LLC
630 United Drive
Durham, NC 27713
Airgas.com

Airgas
an Air Liquide company

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

| | | | |
|---|---|---|---|
| Part Number: | E02NI89E15A1597 | Reference Number: | 122-124526735-1 |
| Cylinder Number: | XC025858B | Cylinder Volume: | 145.3 CF |
| Laboratory: | 124 - Durham (SAP) - NC | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B22015 | Valve Outlet: | 590 |
| Gas Code: | O2,BALN | Certification Date: | Dec 04, 2015 |

**Expiration Date: Dec 04, 2023**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

### ANALYTICAL RESULTS

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|---|---|---|---|---|---|
| OXYGEN | 10.50 % | 10.55 % | G1 | +/- 0.4% NIST Traceable | 12/04/2015 |
| NITROGEN | Balance | | | | |

### CALIBRATION STANDARDS

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|---|---|---|---|---|---|
| NTRM | 09060211 | CC262370 | 9.961 % OXYGEN/NITROGEN | +/- 0.3% | Nov 08, 2018 |

### ANALYTICAL EQUIPMENT

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---|---|---|
| Horiba MPA510 O2 41499150042 | Paramagnetic | Dec 02, 2015 |

**Triad Data Available Upon Request**

Signature on file

**Approved for Release**

# *APPENDIX C*

# *ANALYZERS DATA LOG*

**RCO 2**

| | ppm C3H8 |
|---|---|
| 10/1/2018 17:13 | -6.5 |
| 10/1/2018 17:14 | -6.7 |
| 10/1/2018 17:15 | -6.7 |
| 10/1/2018 17:16 | -6.8 |
| 10/1/2018 17:17 | -6.8 |
| 10/1/2018 17:18 | -6.8 |
| 10/1/2018 17:19 | -6.8 |
| 10/1/2018 17:20 | -6.8 |
| 10/1/2018 17:21 | -6.9 |
| 10/1/2018 17:22 | -7.1 |
| 10/1/2018 17:23 | -7.1 |
| 10/1/2018 17:24 | -7.1 |
| 10/1/2018 17:25 | -7.1 |
| 10/1/2018 17:26 | -7.1 |
| 10/1/2018 17:27 | -7.1 |
| 10/1/2018 17:28 | 170000000.0 |
| 10/1/2018 17:29 | 330000000.0 |
| 10/1/2018 17:30 | 83000000.0 |
| 10/1/2018 17:31 | 170000000.0 |
| 10/1/2018 17:32 | 20.6 |
| 10/1/2018 17:33 | 15.4 |
| 10/1/2018 17:34 | 9.8 |
| 10/1/2018 17:35 | 9.2 |
| 10/1/2018 17:36 | 7.1 |
| 10/1/2018 17:37 | 6.2 |
| 10/1/2018 17:38 | 4.1 |
| 10/1/2018 17:39 | -1.4 |
| 10/1/2018 17:40 | -5.6 |
| 10/1/2018 17:41 | -8.9 |
| 10/1/2018 17:42 | -5.7 |
| 10/1/2018 17:43 | -10.2 |
| 10/1/2018 17:44 | -8.5 |
| 10/1/2018 17:45 | -11.6 |
| 10/1/2018 17:46 | -10.8 |
| 10/1/2018 17:47 | -9.9 |
| 10/1/2018 17:48 | -12.0 |
| 10/1/2018 17:49 | -13.0 |
| 10/1/2018 17:50 | -8.2 |
| 10/1/2018 17:51 | -9.0 |
| 10/1/2018 17:52 | -11.4 |
| 10/1/2018 17:53 | -8.8 |
| 10/1/2018 17:54 | -12.4 |
| 10/1/2018 17:55 | -13.6 |
| 10/1/2018 17:56 | -12.4 |
| 10/1/2018 17:57 | -10.4 |
| 10/1/2018 17:58 | -13.1 |
| 10/1/2018 17:59 | -23.9 |
| 10/1/2018 18:00 | -10.9 |
| 10/1/2018 18:01 | -10.5 |
| 10/1/2018 18:02 | 16.7 |
| 10/1/2018 18:03 | -9.6 |

| | |
|---|---|
| 10/1/2018 18:04 | -13.0 |
| 10/1/2018 18:05 | -32.3 |
| 10/1/2018 18:06 | -14.6 |
| 10/1/2018 18:07 | -11.7 |
| 10/1/2018 18:08 | -21.7 |
| 10/1/2018 18:09 | -19.5 |
| 10/1/2018 18:10 | -19.3 |
| 10/1/2018 18:11 | -15.4 |
| 10/1/2018 18:12 | -13.1 |
| 10/1/2018 18:13 | -7.5 |
| 10/1/2018 18:14 | -5.7 |
| 10/1/2018 18:15 | -1.4 |
| 10/1/2018 18:16 | 2.8 |
| 10/1/2018 18:17 | 1.2 |
| 10/1/2018 18:18 | 1.1 |
| 10/1/2018 18:19 | 4.9 |
| 10/1/2018 18:20 | 4.4 |
| 10/1/2018 18:21 | 5.5 |
| 10/1/2018 18:22 | 5.4 |
| 10/1/2018 18:23 | 4.8 |
| 10/1/2018 18:24 | 6.8 |
| 10/1/2018 18:25 | 8.5 |
| 10/1/2018 18:26 | 6.3 |
| 10/1/2018 18:27 | 9.4 |
| 10/1/2018 18:28 | 10.0 |
| 10/1/2018 18:29 | 12.6 |
| 10/1/2018 18:30 | 11.5 |
| 10/1/2018 18:31 | 11.7 |
| 10/1/2018 18:32 | 83000000.0 |
| 10/1/2018 18:33 | 83000000.0 |
| 10/1/2018 18:34 | 13.5 |
| 10/1/2018 18:35 | 16.5 |
| 10/1/2018 18:36 | 15.8 |
| 10/1/2018 18:37 | 17.8 |
| 10/1/2018 18:38 | 6.4 |
| 10/1/2018 18:39 | 1.6 |
| 10/1/2018 18:40 | 83000000.0 |
| 10/1/2018 18:41 | 300000000.0 |
| 10/1/2018 18:42 | 500000000.0 |
| 10/1/2018 18:43 | 250000000.0 |
| 10/1/2018 18:44 | 500000000.0 |
| 10/1/2018 18:45 | 330000000.0 |
| 10/1/2018 18:46 | 370000000.0 |
| 10/1/2018 18:47 | 0.6 |
| 10/1/2018 18:48 | -0.9 |
| 10/1/2018 18:49 | -1.6 |
| 10/1/2018 18:50 | -2.1 |
| 10/1/2018 18:51 | -2.6 |
| 10/1/2018 18:52 | -3.1 |
| 10/1/2018 18:53 | -3.3 |
| 10/1/2018 18:54 | -3.5 |
| 10/1/2018 18:55 | -3.6 |
| 10/1/2018 18:56 | -1.3 |
| 10/1/2018 18:57 | 3.4 |
| 10/1/2018 18:58 | 4.3 |
| 10/1/2018 18:59 | 1.6 |

| | |
|---|---|
| 10/1/2018 19:00 | 1.1 |
| 10/1/2018 19:01 | 1.3 |
| 10/1/2018 19:02 | 4.7 |
| 10/1/2018 19:03 | 1.3 |
| 10/1/2018 19:04 | 1.3 |
| 10/1/2018 19:05 | 4.8 |
| 10/1/2018 19:06 | 1.6 |
| 10/1/2018 19:07 | 1.3 |
| 10/1/2018 19:08 | 1.3 |
| 10/1/2018 19:09 | 4.8 |
| 10/1/2018 19:10 | 1.4 |
| 10/1/2018 19:11 | 1.4 |
| 10/1/2018 19:12 | 4.7 |
| 10/1/2018 19:13 | 1.7 |
| 10/1/2018 19:14 | 1.3 |
| 10/1/2018 19:15 | 1.4 |
| 10/1/2018 19:16 | 4.9 |
| 10/1/2018 19:17 | 1.4 |
| 10/1/2018 19:18 | 1.3 |
| 10/1/2018 19:19 | 5.0 |
| 10/1/2018 19:20 | 1.7 |
| 10/1/2018 19:21 | 1.3 |
| 10/1/2018 19:22 | 1.3 |
| 10/1/2018 19:23 | 5.0 |
| 10/1/2018 19:24 | 1.4 |
| 10/1/2018 19:25 | 1.3 |
| 10/1/2018 19:26 | 5.1 |
| 10/1/2018 19:27 | 1.8 |
| 10/1/2018 19:28 | 1.3 |
| 10/1/2018 19:29 | 1.4 |
| 10/1/2018 19:30 | 4.9 |
| 10/1/2018 19:31 | 1.5 |
| 10/1/2018 19:32 | 1.4 |
| 10/1/2018 19:33 | 5.1 |
| 10/1/2018 19:34 | 1.8 |
| 10/1/2018 19:35 | 1.3 |
| 10/1/2018 19:36 | 1.3 |
| 10/1/2018 19:37 | 4.2 |
| 10/1/2018 19:38 | 1.3 |
| 10/1/2018 19:39 | 1.3 |
| 10/1/2018 19:40 | 3.8 |
| 10/1/2018 19:41 | 1.5 |
| 10/1/2018 19:42 | 1.0 |
| 10/1/2018 19:43 | 1.0 |
| 10/1/2018 19:44 | 3.7 |
| 10/1/2018 19:45 | 1.2 |
| 10/1/2018 19:46 | 1.1 |
| 10/1/2018 19:47 | 3.9 |
| 10/1/2018 19:48 | 1.5 |
| 10/1/2018 19:49 | 1.0 |
| 10/1/2018 19:50 | 1.0 |
| 10/1/2018 19:51 | 3.7 |
| 10/1/2018 19:52 | 1.1 |
| 10/1/2018 19:53 | 1.1 |
| 10/1/2018 19:54 | 3.7 |
| 10/1/2018 19:55 | 1.3 |

| | |
|---|---|
| 10/1/2018 19:56 | 1.0 |
| 10/1/2018 19:57 | 1.0 |
| 10/1/2018 19:58 | 3.6 |
| 10/1/2018 19:59 | 1.0 |
| 10/1/2018 20:00 | 0.9 |
| | ppm C3H8 |
| 10/2/2018 6:18 | -0.7 |
| 10/2/2018 6:19 | -0.4 |
| 10/2/2018 6:20 | -0.4 |
| 10/2/2018 6:21 | 1.1 |
| 10/2/2018 6:22 | -0.4 |
| 10/2/2018 6:23 | -0.4 |
| 10/2/2018 6:24 | -0.4 |
| 10/2/2018 6:25 | -0.4 |
| 10/2/2018 6:26 | -0.3 |
| 10/2/2018 6:27 | -0.2 |
| 10/2/2018 6:28 | -0.1 |
| 10/2/2018 6:29 | 31.1 |
| 10/2/2018 6:30 | 40.4 |
| 10/2/2018 6:31 | 40.2 |
| 10/2/2018 6:32 | 40.1 |
| 10/2/2018 6:33 | 40.1 |
| 10/2/2018 6:34 | 48.2 |
| 10/2/2018 6:35 | 63.9 |
| 10/2/2018 6:36 | 63.9 |
| 10/2/2018 6:37 | 35.3 |
| 10/2/2018 6:38 | 25.0 |
| 10/2/2018 6:39 | 24.4 |
| 10/2/2018 6:40 | 23.9 |
| 10/2/2018 6:41 | 6.2 |
| 10/2/2018 6:42 | 0.6 |
| 10/2/2018 6:43 | 0.3 |
| 10/2/2018 6:44 | 0.2 |
| 10/2/2018 6:45 | 0.1 |
| 10/2/2018 6:46 | 0.0 |
| 10/2/2018 6:47 | 0.2 |
| 10/2/2018 6:48 | 0.8 |
| 10/2/2018 6:49 | -1.2 |
| 10/2/2018 6:50 | -1.3 |
| 10/2/2018 6:51 | -0.2 |
| 10/2/2018 6:52 | 0.0 |
| 10/2/2018 6:53 | 0.0 |
| 10/2/2018 6:54 | 0.0 |
| 10/2/2018 6:55 | -0.1 |
| 10/2/2018 6:56 | -0.1 |
| 10/2/2018 6:57 | -0.1 |
| 10/2/2018 6:58 | 1.5 |
| 10/2/2018 6:59 | 22.8 |
| 10/2/2018 7:00 | 23.6 |
| 10/2/2018 7:01 | 17.5 |
| 10/2/2018 7:02 | 0.1 |
| 10/2/2018 7:03 | -0.1 |
| 10/2/2018 7:04 | -0.1 |
| 10/2/2018 7:05 | -0.2 |
| 10/2/2018 7:06 | -0.2 |
| 10/2/2018 7:07 | -0.1 |

| | |
|---|---|
| 10/2/2018 7:08 | -0.1 |
| 10/2/2018 7:09 | -0.2 |
| 10/2/2018 7:10 | -0.2 |
| 10/2/2018 7:11 | -0.2 |
| 10/2/2018 7:12 | -0.2 |
| 10/2/2018 7:13 | 11.7 |
| 10/2/2018 7:14 | 5.4 |
| 10/2/2018 7:15 | 4.7 |
| 10/2/2018 7:16 | 5.4 |
| 10/2/2018 7:17 | 12.0 |
| 10/2/2018 7:18 | 4.0 |
| 10/2/2018 7:19 | 4.3 |
| 10/2/2018 7:20 | 13.0 |
| 10/2/2018 7:21 | 5.0 |
| 10/2/2018 7:22 | 3.9 |
| 10/2/2018 7:23 | 4.8 |
| 10/2/2018 7:24 | 12.6 |
| 10/2/2018 7:25 | 4.2 |
| 10/2/2018 7:26 | 4.4 |
| 10/2/2018 7:27 | 13.5 |
| 10/2/2018 7:28 | 5.3 |
| 10/2/2018 7:29 | 4.1 |
| 10/2/2018 7:30 | 4.7 |
| 10/2/2018 7:31 | 12.2 |
| 10/2/2018 7:32 | 4.2 |
| 10/2/2018 7:33 | 4.4 |
| 10/2/2018 7:34 | 13.7 |
| 10/2/2018 7:35 | 5.5 |
| 10/2/2018 7:36 | 4.8 |
| 10/2/2018 7:37 | 5.4 |
| 10/2/2018 7:38 | 13.8 |
| 10/2/2018 7:39 | 4.9 |
| 10/2/2018 7:40 | 5.1 |
| 10/2/2018 7:41 | 14.6 |
| 10/2/2018 7:42 | 6.3 |
| 10/2/2018 7:43 | 5.1 |
| 10/2/2018 7:44 | 5.8 |
| 10/2/2018 7:45 | 14.9 |
| 10/2/2018 7:46 | 5.3 |
| 10/2/2018 7:47 | 5.5 |
| 10/2/2018 7:48 | 16.2 |
| 10/2/2018 7:49 | 6.8 |
| 10/2/2018 7:50 | 5.5 |
| 10/2/2018 7:51 | 5.8 |
| 10/2/2018 7:52 | 13.8 |
| 10/2/2018 7:53 | 4.8 |
| 10/2/2018 7:54 | 4.9 |
| 10/2/2018 7:55 | 13.6 |
| 10/2/2018 7:56 | 6.0 |
| 10/2/2018 7:57 | 4.8 |
| 10/2/2018 7:58 | 5.3 |
| 10/2/2018 7:59 | 13.3 |
| 10/2/2018 8:00 | 4.9 |
| 10/2/2018 8:01 | 4.9 |
| 10/2/2018 8:02 | 14.0 |
| 10/2/2018 8:03 | 6.0 |

| | |
|---|---|
| 10/2/2018 8:04 | 5.2 |
| 10/2/2018 8:05 | 5.5 |
| 10/2/2018 8:06 | 13.6 |
| 10/2/2018 8:07 | 5.1 |
| 10/2/2018 8:08 | 5.0 |
| 10/2/2018 8:09 | 14.1 |
| 10/2/2018 8:10 | 6.2 |
| 10/2/2018 8:11 | 4.7 |
| 10/2/2018 8:12 | 4.9 |
| 10/2/2018 8:13 | 13.4 |
| 10/2/2018 8:14 | 5.5 |
| 10/2/2018 8:15 | 4.9 |
| 10/2/2018 8:16 | 14.5 |
| 10/2/2018 8:17 | 6.1 |
| 10/2/2018 8:18 | 4.9 |
| 10/2/2018 8:19 | 4.8 |
| 10/2/2018 8:20 | 11.7 |
| 10/2/2018 8:21 | 4.3 |
| 10/2/2018 8:22 | 4.2 |
| 10/2/2018 8:23 | 11.6 |
| 10/2/2018 8:24 | 5.2 |
| 10/2/2018 8:25 | 4.3 |
| 10/2/2018 8:26 | 4.6 |
| 10/2/2018 8:27 | 11.8 |
| 10/2/2018 8:28 | 4.4 |
| 10/2/2018 8:29 | 4.6 |
| 10/2/2018 8:30 | 14.0 |
| 10/2/2018 8:31 | 6.1 |
| 10/2/2018 8:32 | 5.0 |
| 10/2/2018 8:33 | 5.4 |
| 10/2/2018 8:34 | 13.9 |
| 10/2/2018 8:35 | 5.1 |
| 10/2/2018 8:36 | 5.1 |
| 10/2/2018 8:37 | 14.5 |
| 10/2/2018 8:38 | 6.4 |
| 10/2/2018 8:39 | 5.2 |
| 10/2/2018 8:40 | 5.5 |
| 10/2/2018 8:41 | 13.8 |
| 10/2/2018 8:42 | 5.1 |
| 10/2/2018 8:43 | 5.1 |
| 10/2/2018 8:44 | 14.2 |
| 10/2/2018 8:45 | 6.0 |
| 10/2/2018 8:46 | 4.7 |
| 10/2/2018 8:47 | 5.7 |
| 10/2/2018 8:48 | 14.2 |
| 10/2/2018 8:49 | 5.3 |
| 10/2/2018 8:50 | 5.5 |
| 10/2/2018 8:51 | 16.0 |
| 10/2/2018 8:52 | 6.7 |
| 10/2/2018 8:53 | 5.8 |
| 10/2/2018 8:54 | 6.7 |
| 10/2/2018 8:55 | 16.5 |
| 10/2/2018 8:56 | 6.0 |
| 10/2/2018 8:57 | 6.0 |
| 10/2/2018 8:58 | 16.7 |
| 10/2/2018 8:59 | 7.3 |

| | |
|---|---|
| 10/2/2018 9:00 | 6.0 |
| 10/2/2018 9:01 | 6.4 |
| 10/2/2018 9:02 | 15.9 |
| 10/2/2018 9:03 | 5.9 |
| 10/2/2018 9:04 | 5.9 |
| 10/2/2018 9:05 | 16.6 |
| 10/2/2018 9:06 | 7.4 |
| 10/2/2018 9:07 | 6.0 |
| 10/2/2018 9:08 | 6.3 |
| 10/2/2018 9:09 | 15.5 |
| 10/2/2018 9:10 | 6.0 |
| 10/2/2018 9:11 | 6.0 |
| 10/2/2018 9:12 | 3.4 |
| 10/2/2018 9:13 | -0.1 |
| 10/2/2018 9:14 | 21.1 |
| 10/2/2018 9:15 | 23.5 |
| 10/2/2018 9:16 | 23.6 |
| 10/2/2018 9:17 | 23.4 |
| 10/2/2018 9:18 | 24.0 |
| 10/2/2018 9:19 | 27.2 |
| 10/2/2018 9:20 | 8.3 |
| 10/2/2018 9:21 | 5.0 |

| Run 1 | ppm C3H8 |
|---|---|
| 10/2/2018 9:22 | 5.5 |
| 10/2/2018 9:23 | 15.4 |
| 10/2/2018 9:24 | 5.6 |
| 10/2/2018 9:25 | 5.7 |
| 10/2/2018 9:26 | 16.2 |
| 10/2/2018 9:27 | 6.3 |
| 10/2/2018 9:28 | 4.9 |
| 10/2/2018 9:29 | 5.6 |
| 10/2/2018 9:30 | 15.8 |
| 10/2/2018 9:31 | 5.6 |
| 10/2/2018 9:32 | 5.4 |
| 10/2/2018 9:33 | 16.3 |
| 10/2/2018 9:34 | 6.8 |
| 10/2/2018 9:35 | 5.5 |
| 10/2/2018 9:36 | 5.6 |
| 10/2/2018 9:37 | 15.9 |
| 10/2/2018 9:38 | 5.5 |
| 10/2/2018 9:39 | 5.3 |
| 10/2/2018 9:40 | 15.8 |
| 10/2/2018 9:41 | 6.3 |
| 10/2/2018 9:42 | 5.3 |
| 10/2/2018 9:43 | 5.5 |
| 10/2/2018 9:44 | 15.1 |
| 10/2/2018 9:45 | 5.0 |
| 10/2/2018 9:46 | 4.9 |
| 10/2/2018 9:47 | 15.5 |
| 10/2/2018 9:48 | 6.5 |
| 10/2/2018 9:49 | 5.3 |
| 10/2/2018 9:50 | 5.3 |
| 10/2/2018 9:51 | 15.1 |
| 10/2/2018 9:52 | 5.3 |

| | | |
|---|---|---|
| 10/2/2018 9:53 | 4.9 | Plant |
| 10/2/2018 9:54 | 12.5 | Down |
| 10/2/2018 9:55 | 5.5 | |
| 10/2/2018 9:56 | 4.5 | |
| 10/2/2018 9:57 | 4.4 | |
| 10/2/2018 9:58 | 11.5 | |
| 10/2/2018 9:59 | 4.3 | |
| 10/2/2018 10:00 | 3.9 | |
| 10/2/2018 10:01 | 11.0 | |
| 10/2/2018 10:02 | 4.5 | |
| 10/2/2018 10:03 | 3.5 | |
| 10/2/2018 10:04 | 3.5 | |
| 10/2/2018 10:05 | 11.1 | |
| 10/2/2018 10:06 | 4.1 | |
| 10/2/2018 10:07 | 3.8 | |
| 10/2/2018 10:08 | 11.8 | |
| 10/2/2018 10:09 | 4.7 | |
| 10/2/2018 10:10 | 3.7 | |
| 10/2/2018 10:11 | 4.2 | |
| 10/2/2018 10:12 | 11.7 | |
| 10/2/2018 10:13 | 4.0 | |
| 10/2/2018 10:14 | 3.9 | |
| 10/2/2018 10:15 | 12.5 | |
| 10/2/2018 10:16 | 4.8 | |
| 10/2/2018 10:17 | 3.8 | |
| 10/2/2018 10:18 | 4.5 | |
| 10/2/2018 10:19 | 12.5 | |
| 10/2/2018 10:20 | 4.2 | |
| 10/2/2018 10:21 | 4.0 | |
| 10/2/2018 10:22 | 12.6 | |
| 10/2/2018 10:23 | 5.0 | |
| 10/2/2018 10:24 | 4.0 | |
| 10/2/2018 10:25 | 4.6 | |
| 10/2/2018 10:26 | 12.4 | |
| 10/2/2018 10:27 | 4.2 | |
| 10/2/2018 10:28 | 3.9 | |
| 10/2/2018 10:29 | 12.0 | |
| 10/2/2018 10:30 | 4.8 | |
| 10/2/2018 10:31 | 3.7 | |
| 10/2/2018 10:32 | 4.1 | |
| 10/2/2018 10:33 | 11.9 | |
| 10/2/2018 10:34 | 4.0 | |
| 10/2/2018 10:35 | 3.9 | |
| 10/2/2018 10:36 | 12.7 | |
| 10/2/2018 10:37 | 4.8 | |
| 10/2/2018 10:38 | 3.8 | |
| 10/2/2018 10:39 | 4.4 | |
| 10/2/2018 10:40 | 12.1 | |
| 10/2/2018 10:41 | 4.2 | |
| 10/2/2018 10:42 | 4.0 | |
| 10/2/2018 10:43 | 11.8 | |
| 10/2/2018 10:44 | 4.7 | |
| 10/2/2018 10:45 | 3.8 | |
| 10/2/2018 10:46 | 4.2 | |

| | |
|---|---|
| 10/2/2018 10:47 | 11.7 |
| 10/2/2018 10:48 | 3.7 |
| 10/2/2018 10:49 | 3.6 |
| 10/2/2018 10:50 | 11.4 |
| 10/2/2018 10:51 | 4.7 |
| 10/2/2018 10:52 | 3.9 |
| 10/2/2018 10:53 | 4.0 |
| 10/2/2018 10:54 | 11.6 |
| 10/2/2018 10:55 | 4.2 |
| 10/2/2018 10:56 | 4.0 |
| 10/2/2018 10:57 | 4.0 |
| 10/2/2018 10:58 | 1.3 |
| 10/2/2018 10:59 | 0.9 |
| 10/2/2018 11:00 | 0.7 |
| 10/2/2018 11:01 | 3.2 |
| 10/2/2018 11:02 | 1.0 |
| 10/2/2018 11:03 | 0.6 |
| 10/2/2018 11:04 | 1.8 |
| 10/2/2018 11:05 | 1.4 |
| 10/2/2018 11:06 | 1.9 |
| 10/2/2018 11:07 | 1.9 |
| 10/2/2018 11:08 | 0.6 |
| 10/2/2018 11:09 | 0.2 |
| 10/2/2018 11:10 | 0.1 |
| 10/2/2018 11:11 | 0.3 |
| 10/2/2018 11:12 | 0.4 |
| 10/2/2018 11:13 | 0.0 |
| 10/2/2018 11:14 | 0.0 |
| 10/2/2018 11:15 | 0.4 |
| 10/2/2018 11:16 | 0.0 |
| 10/2/2018 11:17 | 0.0 |
| 10/2/2018 11:18 | 0.3 |
| 10/2/2018 11:19 | 0.2 |
| 10/2/2018 11:20 | -0.1 |
| 10/2/2018 11:21 | -0.1 |
| 10/2/2018 11:22 | 1.2 |
| 10/2/2018 11:23 | 4.7 |
| 10/2/2018 11:24 | 2.1 |
| 10/2/2018 11:25 | 0.1 |
| 10/2/2018 11:26 | 0.4 |
| 10/2/2018 11:27 | 0.8 |
| 10/2/2018 11:28 | 2.3 |
| 10/2/2018 11:29 | 1.5 |
| 10/2/2018 11:30 | 0.5 |
| 10/2/2018 11:31 | 0.5 |
| 10/2/2018 11:32 | 2.8 |
| 10/2/2018 11:33 | 1.8 |
| 10/2/2018 11:34 | 0.9 |
| 10/2/2018 11:35 | 1.4 |
| 10/2/2018 11:36 | 7.1 |
| 10/2/2018 11:37 | 2.1 |
| 10/2/2018 11:38 | 2.2 |
| 10/2/2018 11:39 | 4.2 |
| 10/2/2018 11:40 | 1.5 |

| | |
|---|---|
| 10/2/2018 11:41 | 0.6 |
| 10/2/2018 11:42 | 0.4 |
| 10/2/2018 11:43 | 2.9 |
| 10/2/2018 11:44 | 0.6 |
| 10/2/2018 11:45 | 2.0 |
| 10/2/2018 11:46 | 1.1 |
| 10/2/2018 11:47 | 2.0 |
| 10/2/2018 11:48 | 2.7 |
| 10/2/2018 11:49 | 3.3 |
| 10/2/2018 11:50 | 12.7 |
| 10/2/2018 11:51 | 3.5 |
| 10/2/2018 11:52 | 3.1 |
| 10/2/2018 11:53 | 12.6 |
| 10/2/2018 11:54 | 4.7 |
| 10/2/2018 11:55 | 3.8 |
| 10/2/2018 11:56 | 3.7 |
| 10/2/2018 11:57 | 13.7 |
| 10/2/2018 11:58 | 4.0 |
| 10/2/2018 11:59 | 3.8 |
| 10/2/2018 12:00 | 13.8 |
| 10/2/2018 12:01 | 5.3 |
| 10/2/2018 12:02 | 4.2 |
| 10/2/2018 12:03 | 4.4 |
| 10/2/2018 12:04 | 14.1 |
| 10/2/2018 12:05 | 4.6 |
| 10/2/2018 12:06 | 4.3 |
| 10/2/2018 12:07 | 14.3 |
| 10/2/2018 12:08 | 5.7 |
| 10/2/2018 12:09 | 4.7 |
| 10/2/2018 12:10 | 4.7 |
| 10/2/2018 12:11 | 14.8 |
| 10/2/2018 12:12 | 4.8 |
| 10/2/2018 12:13 | 4.3 |
| 10/2/2018 12:14 | 14.2 |
| 10/2/2018 12:15 | 5.9 |
| 10/2/2018 12:16 | 4.8 |
| 10/2/2018 12:17 | 4.8 |
| 10/2/2018 12:18 | 14.4 |
| 10/2/2018 12:19 | 4.9 |
| 10/2/2018 12:20 | 4.5 |
| 10/2/2018 12:21 | 14.1 |
| 10/2/2018 12:22 | 5.8 |
| 10/2/2018 12:23 | 4.6 |
| 10/2/2018 12:24 | 4.7 |
| 10/2/2018 12:25 | 14.1 |
| 10/2/2018 12:26 | 4.8 |
| 10/2/2018 12:27 | 4.5 |
| 10/2/2018 12:28 | 14.2 |
| 10/2/2018 12:29 | 5.8 |
| 10/2/2018 12:30 | 4.7 |
| 10/2/2018 12:31 | 4.9 |
| 10/2/2018 12:32 | 14.6 |
| 10/2/2018 12:33 | 5.0 |
| 10/2/2018 12:34 | 4.6 |

| | |
|---|---|
| 10/2/2018 12:35 | 14.5 |
| Avg Run 1 | 8.0 |
| 10/2/2018 12:36 | 5.7 |
| 10/2/2018 12:37 | 0.1 |
| 10/2/2018 12:38 | -0.3 |
| 10/2/2018 12:39 | 5.2 |
| 10/2/2018 12:40 | 22.0 |
| 10/2/2018 12:41 | 23.6 |
| 10/2/2018 12:42 | 22.5 |
| 10/2/2018 12:43 | 21.6 |
| 10/2/2018 12:44 | 4.0 |
| 10/2/2018 12:45 | 4.6 |
| 10/2/2018 12:46 | 14.5 |

| Run 2 | ppm C3H8 |
|---|---|
| 10/2/2018 12:47 | 4.8 |
| 10/2/2018 12:48 | 4.5 |
| 10/2/2018 12:49 | 14.6 |
| 10/2/2018 12:50 | 5.8 |
| 10/2/2018 12:51 | 4.7 |
| 10/2/2018 12:52 | 4.9 |
| 10/2/2018 12:53 | 14.6 |
| 10/2/2018 12:54 | 5.0 |
| 10/2/2018 12:55 | 4.6 |
| 10/2/2018 12:56 | 14.0 |
| 10/2/2018 12:57 | 5.9 |
| 10/2/2018 12:58 | 4.7 |
| 10/2/2018 12:59 | 4.7 |
| 10/2/2018 13:00 | 14.3 |
| 10/2/2018 13:01 | 4.7 |
| 10/2/2018 13:02 | 4.4 |
| 10/2/2018 13:03 | 14.4 |
| 10/2/2018 13:04 | 5.8 |
| 10/2/2018 13:05 | 4.7 |
| 10/2/2018 13:06 | 4.7 |
| 10/2/2018 13:07 | 13.8 |
| 10/2/2018 13:08 | 4.8 |
| 10/2/2018 13:09 | 4.6 |
| 10/2/2018 13:10 | 14.6 |
| 10/2/2018 13:11 | 6.0 |
| 10/2/2018 13:12 | 4.7 |
| 10/2/2018 13:13 | 4.9 |
| 10/2/2018 13:14 | 14.6 |
| 10/2/2018 13:15 | 4.9 |
| 10/2/2018 13:16 | 4.6 |
| 10/2/2018 13:17 | 14.4 |
| 10/2/2018 13:18 | 6.0 |
| 10/2/2018 13:19 | 4.9 |
| 10/2/2018 13:20 | 4.9 |
| 10/2/2018 13:21 | 14.9 |
| 10/2/2018 13:22 | 5.0 |
| 10/2/2018 13:23 | 4.7 |
| 10/2/2018 13:24 | 14.8 |
| 10/2/2018 13:25 | 6.0 |
| 10/2/2018 13:26 | 4.7 |

| | |
|---|---|
| 10/2/2018 13:27 | 4.7 |
| 10/2/2018 13:28 | 14.5 |
| 10/2/2018 13:29 | 4.7 |
| 10/2/2018 13:30 | 4.5 |
| 10/2/2018 13:31 | 14.0 |
| 10/2/2018 13:32 | 5.9 |
| 10/2/2018 13:33 | 4.6 |
| 10/2/2018 13:34 | 4.8 |
| 10/2/2018 13:35 | 14.5 |
| 10/2/2018 13:36 | 4.9 |
| 10/2/2018 13:37 | 4.6 |
| 10/2/2018 13:38 | 14.1 |
| 10/2/2018 13:39 | 5.9 |
| 10/2/2018 13:40 | 4.8 |
| 10/2/2018 13:41 | 4.9 |
| 10/2/2018 13:42 | 14.2 |
| 10/2/2018 13:43 | 4.8 |
| 10/2/2018 13:44 | 4.5 |
| 10/2/2018 13:45 | 14.5 |
| 10/2/2018 13:46 | 6.1 |
| Avg Run 2 | 7.7 |
| 10/2/2018 13:47 | 5.3 |
| 10/2/2018 13:48 | 0.0 |
| 10/2/2018 13:49 | -0.3 |
| 10/2/2018 13:50 | 19.7 |
| 10/2/2018 13:51 | 23.5 |
| 10/2/2018 13:52 | 23.4 |
| 10/2/2018 13:53 | 7.9 |
| 10/2/2018 13:54 | 4.5 |

| Run 3 | ppm C3H8 |
|---|---|
| 10/2/2018 13:55 | 4.7 |
| 10/2/2018 13:56 | 14.1 |
| 10/2/2018 13:57 | 4.7 |
| 10/2/2018 13:58 | 4.4 |
| 10/2/2018 13:59 | 9.3 |
| 10/2/2018 14:00 | 3.3 |
| 10/2/2018 14:01 | 1.9 |
| 10/2/2018 14:02 | 1.2 |
| 10/2/2018 14:03 | 1.7 |
| 10/2/2018 14:04 | 4.3 |
| 10/2/2018 14:05 | 4.3 |
| 10/2/2018 14:06 | 4.2 |
| 10/2/2018 14:07 | 1.1 |
| 10/2/2018 14:08 | 0.4 |
| 10/2/2018 14:09 | 3.8 |
| 10/2/2018 14:10 | 0.5 |
| 10/2/2018 14:11 | 0.5 |
| 10/2/2018 14:12 | 0.8 |
| 10/2/2018 14:13 | 3.2 |
| 10/2/2018 14:14 | 0.2 |
| 10/2/2018 14:15 | 0.1 |
| 10/2/2018 14:16 | 2.0 |
| 10/2/2018 14:17 | 1.0 |
| 10/2/2018 14:18 | 1.6 |

| | |
|---|---|
| 10/2/2018 14:19 | 9.5 |
| 10/2/2018 14:20 | 6.0 |
| 10/2/2018 14:21 | 3.9 |
| 10/2/2018 14:22 | 4.6 |
| 10/2/2018 14:23 | 15.1 |
| 10/2/2018 14:24 | 5.4 |
| 10/2/2018 14:25 | 3.4 |
| 10/2/2018 14:26 | 9.8 |
| 10/2/2018 14:27 | 5.8 |
| 10/2/2018 14:28 | 3.7 |
| 10/2/2018 14:29 | 4.2 |
| 10/2/2018 14:30 | 14.1 |
| 10/2/2018 14:31 | 5.2 |
| 10/2/2018 14:32 | 4.0 |
| 10/2/2018 14:33 | 10.1 |
| 10/2/2018 14:34 | 5.5 |
| 10/2/2018 14:35 | 3.7 |
| 10/2/2018 14:36 | 4.1 |
| 10/2/2018 14:37 | 13.7 |
| 10/2/2018 14:38 | 4.0 |
| 10/2/2018 14:39 | 3.7 |
| 10/2/2018 14:40 | 9.9 |
| 10/2/2018 14:41 | 5.6 |
| 10/2/2018 14:42 | 3.7 |
| 10/2/2018 14:43 | 4.1 |
| 10/2/2018 14:44 | 14.6 |
| 10/2/2018 14:45 | 4.3 |
| 10/2/2018 14:46 | 4.0 |
| 10/2/2018 14:47 | 10.3 |
| 10/2/2018 14:48 | 5.9 |
| 10/2/2018 14:49 | 3.9 |
| 10/2/2018 14:50 | 4.3 |
| 10/2/2018 14:51 | 14.8 |
| 10/2/2018 14:52 | 4.5 |
| 10/2/2018 14:53 | 4.2 |
| 10/2/2018 14:54 | 10.8 |
| 10/2/2018 14:55 | 6.3 |
| 10/2/2018 14:56 | 4.1 |
| 10/2/2018 14:57 | 4.3 |
| 10/2/2018 14:58 | 15.2 |
| 10/2/2018 14:59 | 4.6 |
| 10/2/2018 15:00 | 4.2 |
| 10/2/2018 15:01 | 10.9 |
| 10/2/2018 15:02 | 6.1 |
| 10/2/2018 15:03 | 4.2 |
| 10/2/2018 15:04 | 4.5 |
| 10/2/2018 15:05 | 15.4 |
| 10/2/2018 15:06 | 5.1 |
| 10/2/2018 15:07 | 4.4 |
| 10/2/2018 15:08 | 11.4 |
| 10/2/2018 15:09 | 6.4 |
| 10/2/2018 15:10 | 4.3 |
| 10/2/2018 15:11 | 4.6 |
| 10/2/2018 15:12 | 15.5 |

| | |
|---|---|
| 10/2/2018 15:13 | 5.2 |
| 10/2/2018 15:14 | 4.6 |
| 10/2/2018 15:15 | 11.6 |
| 10/2/2018 15:16 | 6.6 |
| 10/2/2018 15:17 | 4.4 |
| 10/2/2018 15:18 | 4.7 |
| 10/2/2018 15:19 | 15.8 |
| 10/2/2018 15:20 | 5.4 |
| 10/2/2018 15:21 | 4.6 |
| 10/2/2018 15:22 | 11.5 |
| 10/2/2018 15:23 | 6.6 |
| 10/2/2018 15:24 | 4.5 |
| 10/2/2018 15:25 | 4.6 |
| 10/2/2018 15:26 | 16.0 |
| 10/2/2018 15:27 | 5.2 |
| 10/2/2018 15:28 | 4.4 |
| 10/2/2018 15:29 | 11.8 |
| 10/2/2018 15:30 | 6.4 |
| 10/2/2018 15:31 | 4.2 |
| 10/2/2018 15:32 | 4.5 |
| 10/2/2018 15:33 | 15.6 |
| 10/2/2018 15:34 | 5.1 |
| 10/2/2018 15:35 | 4.4 |
| 10/2/2018 15:36 | 12.0 |
| 10/2/2018 15:37 | 6.7 |
| 10/2/2018 15:38 | 4.5 |
| 10/2/2018 15:39 | 4.8 |
| 10/2/2018 15:40 | 15.7 |
| 10/2/2018 15:41 | 5.4 |
| 10/2/2018 15:42 | 4.7 |
| 10/2/2018 15:43 | 11.8 |
| 10/2/2018 15:44 | 6.7 |
| 10/2/2018 15:45 | 4.5 |
| 10/2/2018 15:46 | 4.8 |
| 10/2/2018 15:47 | 15.5 |
| 10/2/2018 15:48 | 5.4 |
| 10/2/2018 15:49 | 4.7 |
| 10/2/2018 15:50 | 11.9 |
| 10/2/2018 15:51 | 6.8 |
| 10/2/2018 15:52 | 10.8 |
| Avg Run 3 | 7.6 |
| 10/2/2018 15:53 | 23.4 |
| 10/2/2018 15:54 | 23.7 |
| 10/2/2018 15:55 | 23.8 |
| 10/2/2018 15:56 | 10.4 |
| 10/2/2018 15:57 | -0.4 |
| 10/2/2018 15:58 | -0.3 |
| 10/2/2018 15:59 | 0.3 |
| 10/2/2018 16:00 | 1.5 |
| 10/2/2018 16:01 | -0.3 |
| 10/2/2018 16:02 | -0.4 |
| 10/2/2018 16:03 | -0.4 |
| 10/2/2018 16:04 | -0.4 |

| Baghouse | BH1 | ppm C3H8 |
|---|---|---|
| 10/3/2018 | 6:34 | -1.3 |
| 10/3/2018 | 6:35 | 0.0 |
| 10/3/2018 | 6:36 | -0.1 |
| 10/3/2018 | 6:37 | -0.1 |
| 10/3/2018 | 6:38 | -0.2 |
| 10/3/2018 | 6:39 | -0.2 |
| 10/3/2018 | 6:40 | -0.1 |
| 10/3/2018 | 6:41 | 0.1 |
| 10/3/2018 | 6:42 | 0.3 |
| 10/3/2018 | 6:43 | 0.1 |
| 10/3/2018 | 6:44 | 85.0 |
| 10/3/2018 | 6:45 | 93.7 |
| 10/3/2018 | 6:46 | 98.6 |
| 10/3/2018 | 6:47 | 99.3 |
| 10/3/2018 | 6:48 | 99.5 |
| 10/3/2018 | 6:49 | 97.1 |
| 10/3/2018 | 6:50 | 153.8 |
| 10/3/2018 | 6:51 | 161.6 |
| 10/3/2018 | 6:52 | 108.5 |
| 10/3/2018 | 6:53 | 59.3 |
| 10/3/2018 | 6:54 | 58.8 |
| 10/3/2018 | 6:55 | 58.5 |
| 10/3/2018 | 6:56 | 58.4 |
| 10/3/2018 | 6:57 | 59.2 |
| 10/3/2018 | 6:58 | 59.1 |
| 10/3/2018 | 6:59 | 59.1 |
| 10/3/2018 | 7:00 | 58.9 |
| 10/3/2018 | 7:01 | 35.7 |
| 10/3/2018 | 7:02 | 0.9 |
| 10/3/2018 | 7:03 | 0.7 |
| 10/3/2018 | 7:04 | 0.6 |
| 10/3/2018 | 7:05 | 0.5 |
| 10/3/2018 | 7:06 | 0.4 |
| 10/3/2018 | 7:07 | 0.3 |
| 10/3/2018 | 7:08 | 0.2 |
| 10/3/2018 | 7:09 | 0.2 |
| 10/3/2018 | 7:10 | 0.1 |
| 10/3/2018 | 7:11 | 0.1 |
| 10/3/2018 | 7:12 | 0.1 |
| 10/3/2018 | 7:13 | 0.2 |

| | |
|---|---|
| 10/3/2018 7:14 | 0.1 |
| 10/3/2018 7:15 | 0.2 |
| 10/3/2018 7:16 | 0.1 |
| 10/3/2018 7:17 | 0.1 |
| 10/3/2018 7:18 | 1.7 |
| 10/3/2018 7:19 | 70.6 |
| 10/3/2018 7:20 | 82.7 |
| 10/3/2018 7:21 | 86.0 |
| 10/3/2018 7:22 | 82.8 |
| 10/3/2018 7:23 | 81.9 |
| 10/3/2018 7:24 | 80.9 |
| 10/3/2018 7:25 | 81.7 |
| 10/3/2018 7:26 | 80.6 |
| 10/3/2018 7:27 | 79.8 |
| 10/3/2018 7:28 | 79.2 |
| 10/3/2018 7:29 | 78.5 |
| 10/3/2018 7:30 | 75.4 |
| 10/3/2018 7:31 | 71.6 |
| 10/3/2018 7:32 | 71.6 |
| 10/3/2018 7:33 | 73.5 |
| 10/3/2018 7:34 | 72.9 |
| 10/3/2018 7:35 | 73.1 |
| 10/3/2018 7:36 | 74.4 |
| 10/3/2018 7:37 | 75.7 |
| 10/3/2018 7:38 | 74.5 |
| 10/3/2018 7:39 | 75.2 |
| 10/3/2018 7:40 | 75.2 |
| 10/3/2018 7:41 | 75.9 |
| 10/3/2018 7:42 | 76.7 |
| 10/3/2018 7:43 | 74.8 |
| 10/3/2018 7:44 | 73.0 |
| 10/3/2018 7:45 | 76.3 |
| 10/3/2018 7:46 | 79.4 |

| **Run 1** | **ppm C3H8** |
|---|---|
| 10/3/2018 7:47 | 76.4 |
| 10/3/2018 7:48 | 74.8 |
| 10/3/2018 7:49 | 75.5 |
| 10/3/2018 7:50 | 77.3 |
| 10/3/2018 7:51 | 75.7 |
| 10/3/2018 7:52 | 74.4 |
| 10/3/2018 7:53 | 73.4 |
| 10/3/2018 7:54 | 75.6 |
| 10/3/2018 7:55 | 77.2 |
| 10/3/2018 7:56 | 80.3 |
| 10/3/2018 7:57 | 84.7 |
| 10/3/2018 7:58 | 83.6 |
| 10/3/2018 7:59 | 79.5 |
| 10/3/2018 8:00 | 79.2 |
| 10/3/2018 8:01 | 78.7 |

| | | |
|---|---|---|
| 10/3/2018 8:02 | 79.3 | |
| 10/3/2018 8:03 | 79.0 | |
| 10/3/2018 8:04 | 80.7 | |
| 10/3/2018 8:05 | 79.9 | |
| 10/3/2018 8:06 | 78.1 | |
| 10/3/2018 8:07 | 78.2 | |
| 10/3/2018 8:08 | 76.4 | |
| 10/3/2018 8:09 | 76.7 | |
| 10/3/2018 8:10 | 76.2 | |
| 10/3/2018 8:11 | 74.2 | |
| 10/3/2018 8:12 | 75.7 | |
| 10/3/2018 8:13 | 77.6 | |
| 10/3/2018 8:14 | 80.3 | |
| 10/3/2018 8:15 | 80.8 | |
| 10/3/2018 8:16 | 80.3 | |
| 10/3/2018 8:17 | 76.9 | |
| 10/3/2018 8:18 | 77.0 | |
| 10/3/2018 8:19 | 78.4 | |
| 10/3/2018 8:20 | 76.0 | |
| 10/3/2018 8:21 | 73.7 | |
| 10/3/2018 8:22 | 71.8 | |
| 10/3/2018 8:23 | 72.2 | down |
| 10/3/2018 8:24 | 73.0 | |
| 10/3/2018 8:25 | 72.0 | |
| 10/3/2018 8:26 | 72.8 | |
| 10/3/2018 8:27 | 74.0 | |
| 10/3/2018 8:28 | 75.8 | |
| 10/3/2018 8:29 | 76.0 | |
| 10/3/2018 8:30 | 73.5 | |
| 10/3/2018 8:31 | 71.3 | |
| 10/3/2018 8:32 | 70.7 | |
| 10/3/2018 8:33 | 70.5 | |
| 10/3/2018 8:34 | 68.5 | |
| 10/3/2018 8:35 | 68.2 | |
| 10/3/2018 8:36 | 65.7 | |
| 10/3/2018 8:37 | 62.7 | |
| 10/3/2018 8:38 | 61.6 | |
| 10/3/2018 8:39 | 60.1 | |
| 10/3/2018 8:40 | 59.6 | |
| 10/3/2018 8:41 | 58.8 | |
| 10/3/2018 8:42 | 58.2 | |
| 10/3/2018 8:43 | 59.9 | |
| 10/3/2018 8:44 | 58.4 | |
| 10/3/2018 8:45 | 58.6 | |
| 10/3/2018 8:46 | 60.7 | |
| 10/3/2018 8:47 | 61.4 | |
| 10/3/2018 8:48 | 61.2 | |
| 10/3/2018 8:49 | 63.5 | |

| | |
|---|---|
| 10/3/2018 8:50 | 64.4 |
| 10/3/2018 8:51 | 64.8 |
| 10/3/2018 8:52 | 66.1 |
| 10/3/2018 8:53 | 67.3 |
| 10/3/2018 8:54 | 68.2 |
| 10/3/2018 8:55 | 68.5 |
| 10/3/2018 8:56 | 70.8 |
| 10/3/2018 8:57 | 71.1 |
| 10/3/2018 8:58 | 71.9 |
| 10/3/2018 8:59 | 72.4 |
| 10/3/2018 9:00 | 72.1 |
| 10/3/2018 9:01 | 73.5 |
| 10/3/2018 9:02 | 73.7 |
| 10/3/2018 9:03 | 73.7 |
| 10/3/2018 9:04 | 73.3 |
| 10/3/2018 9:05 | 73.5 |
| 10/3/2018 9:06 | 75.9 |
| 10/3/2018 9:07 | 77.0 |
| 10/3/2018 9:08 | 77.1 |
| 10/3/2018 9:09 | 75.7 |
| 10/3/2018 9:10 | 75.4 |
| 10/3/2018 9:11 | 75.7 |
| 10/3/2018 9:12 | 76.0 |
| 10/3/2018 9:13 | 76.0 |
| 10/3/2018 9:14 | 75.9 |
| 10/3/2018 9:15 | 75.5 |
| 10/3/2018 9:16 | 75.5 |
| 10/3/2018 9:17 | 76.0 |
| 10/3/2018 9:18 | 76.7 |
| 10/3/2018 9:19 | 75.2 |
| 10/3/2018 9:20 | 75.1 |
| 10/3/2018 9:21 | 74.1 |
| 10/3/2018 9:22 | 73.3 |
| 10/3/2018 9:23 | 75.4 |
| 10/3/2018 9:24 | 76.0 |
| 10/3/2018 9:25 | 76.1 |
| 10/3/2018 9:26 | 77.1 |
| 10/3/2018 9:27 | 78.2 |
| 10/3/2018 9:28 | 79.7 |
| 10/3/2018 9:29 | 81.6 |
| 10/3/2018 9:30 | 82.6 |
| 10/3/2018 9:31 | 82.8 |
| 10/3/2018 9:32 | 84.2 |
| 10/3/2018 9:33 | 84.9 |
| 10/3/2018 9:34 | 84.1 |
| 10/3/2018 9:35 | 85.2 |
| 10/3/2018 9:36 | 84.9 |
| 10/3/2018 9:37 | 83.3 |

| | |
|---|---|
| 10/3/2018 9:38 | 83.0 |
| 10/3/2018 9:39 | 82.5 |
| 10/3/2018 9:40 | 82.6 |
| 10/3/2018 9:41 | 84.4 |
| 10/3/2018 9:42 | 83.7 |
| 10/3/2018 9:43 | 85.0 |
| 10/3/2018 9:44 | 85.2 |
| 10/3/2018 9:45 | 85.3 |
| 10/3/2018 9:46 | 86.3 |
| 10/3/2018 9:47 | 86.2 |
| 10/3/2018 9:48 | 86.0 |
| 10/3/2018 9:49 | 88.4 |
| 10/3/2018 9:50 | 87.5 |
| 10/3/2018 9:51 | 87.9 |
| 10/3/2018 9:52 | 62.2 |
| **AVG Run 1** | **80.1** |
| 10/3/2018 9:53 | 0.8 |
| 10/3/2018 9:54 | 0.5 |
| 10/3/2018 9:55 | 44.6 |
| 10/3/2018 9:56 | 99.1 |
| 10/3/2018 9:57 | 96.1 |
| 10/3/2018 9:58 | 85.1 |
| 10/3/2018 9:59 | 91.1 |
| **Run 2** | **ppm C3H8** |
| 10/3/2018 10:00 | 91.1 |
| 10/3/2018 10:01 | 94.7 |
| 10/3/2018 10:02 | 94.6 |
| 10/3/2018 10:03 | 94.2 |
| 10/3/2018 10:04 | 95.4 |
| 10/3/2018 10:05 | 96.3 |
| 10/3/2018 10:06 | 98.9 |
| 10/3/2018 10:07 | 95.7 |
| 10/3/2018 10:08 | 96.9 |
| 10/3/2018 10:09 | 96.2 |
| 10/3/2018 10:10 | 95.9 |
| 10/3/2018 10:11 | 94.2 |
| 10/3/2018 10:12 | 97.8 |
| 10/3/2018 10:13 | 95.2 |
| 10/3/2018 10:14 | 94.1 |
| 10/3/2018 10:15 | 93.7 |
| 10/3/2018 10:16 | 93.0 |
| 10/3/2018 10:17 | 91.0 |
| 10/3/2018 10:18 | 90.1 |
| 10/3/2018 10:19 | 90.2 |
| 10/3/2018 10:20 | 91.3 |
| 10/3/2018 10:21 | 90.9 |
| 10/3/2018 10:22 | 90.5 |
| 10/3/2018 10:23 | 89.4 |

| | |
|---|---|
| 10/3/2018 10:24 | 89.0 |
| 10/3/2018 10:25 | 89.4 |
| 10/3/2018 10:26 | 90.4 |
| 10/3/2018 10:27 | 89.2 |
| 10/3/2018 10:28 | 87.9 |
| 10/3/2018 10:29 | 90.2 |
| 10/3/2018 10:30 | 88.7 |
| 10/3/2018 10:31 | 90.3 |
| 10/3/2018 10:32 | 92.1 |
| 10/3/2018 10:33 | 90.7 |
| 10/3/2018 10:34 | 89.1 |
| 10/3/2018 10:35 | 92.2 |
| 10/3/2018 10:36 | 91.1 |
| 10/3/2018 10:37 | 90.6 |
| 10/3/2018 10:38 | 91.3 |
| 10/3/2018 10:39 | 93.0 |
| 10/3/2018 10:40 | 92.5 |
| 10/3/2018 10:41 | 91.0 |
| 10/3/2018 10:42 | 88.7 |
| 10/3/2018 10:43 | 89.2 |
| 10/3/2018 10:44 | 90.4 |
| 10/3/2018 10:45 | 92.7 |
| 10/3/2018 10:46 | 96.3 |
| 10/3/2018 10:47 | 98.1 |
| 10/3/2018 10:48 | 98.7 |
| 10/3/2018 10:49 | 95.9 |
| 10/3/2018 10:50 | 97.6 |
| 10/3/2018 10:51 | 99.7 |
| 10/3/2018 10:52 | 102.3 |
| 10/3/2018 10:53 | 101.5 |
| 10/3/2018 10:54 | 101.4 |
| 10/3/2018 10:55 | 100.5 |
| 10/3/2018 10:56 | 103.3 |
| 10/3/2018 10:57 | 103.3 |
| 10/3/2018 10:58 | 105.2 |
| 10/3/2018 10:59 | 102.0 |
| **AVG Run 2** | **94.1** |
| 10/3/2018 11:00 | 102.7 |
| 10/3/2018 11:01 | 49.3 |
| 10/3/2018 11:02 | 0.8 |
| 10/3/2018 11:03 | 29.7 |
| 10/3/2018 11:04 | 32.7 |
| 10/3/2018 11:05 | 94.7 |
| 10/3/2018 11:06 | 99.9 |
| 10/3/2018 11:07 | 94.0 |
| 10/3/2018 11:08 | 111.8 |

| **Run 3** | **ppm C3H8** |
|---|---|
| 10/3/2018 11:09 | 109.7 |

| | |
|---|---|
| 10/3/2018 11:10 | 110.5 |
| 10/3/2018 11:11 | 109.3 |
| 10/3/2018 11:12 | 110.6 |
| 10/3/2018 11:13 | 110.8 |
| 10/3/2018 11:14 | 117.3 |
| 10/3/2018 11:15 | 115.7 |
| 10/3/2018 11:16 | 109.9 |
| 10/3/2018 11:17 | 109.7 |
| 10/3/2018 11:18 | 116.0 |
| 10/3/2018 11:19 | 115.1 |
| 10/3/2018 11:20 | 112.7 |
| 10/3/2018 11:21 | 109.5 |
| 10/3/2018 11:22 | 108.4 |
| 10/3/2018 11:23 | 110.5 |
| 10/3/2018 11:24 | 110.7 |
| 10/3/2018 11:25 | 111.9 |
| 10/3/2018 11:26 | 105.0 |
| 10/3/2018 11:27 | 104.4 |
| 10/3/2018 11:28 | 107.7 |
| 10/3/2018 11:29 | 107.0 |
| 10/3/2018 11:30 | 108.2 |
| 10/3/2018 11:31 | 108.3 |
| 10/3/2018 11:32 | 111.2 |
| 10/3/2018 11:33 | 108.0 |
| 10/3/2018 11:34 | 110.5 |
| 10/3/2018 11:35 | 110.2 |
| 10/3/2018 11:36 | 109.9 |
| 10/3/2018 11:37 | 111.9 |
| 10/3/2018 11:38 | 112.1 |
| 10/3/2018 11:39 | 111.4 |
| 10/3/2018 11:40 | 111.8 |
| 10/3/2018 11:41 | 113.1 |
| 10/3/2018 11:42 | 111.8 |
| 10/3/2018 11:43 | 112.9 |
| 10/3/2018 11:44 | 113.7 |
| 10/3/2018 11:45 | 111.7 |
| 10/3/2018 11:46 | 109.4 |
| 10/3/2018 11:47 | 109.0 |
| 10/3/2018 11:48 | 109.3 |
| 10/3/2018 11:49 | 108.6 |
| 10/3/2018 11:50 | 107.3 |
| 10/3/2018 11:51 | 110.5 |
| 10/3/2018 11:52 | 111.6 |
| 10/3/2018 11:53 | 108.9 |
| 10/3/2018 11:54 | 110.3 |
| 10/3/2018 11:55 | 111.3 |
| 10/3/2018 11:56 | 110.9 |
| 10/3/2018 11:57 | 114.3 |

| | |
|---|---|
| 10/3/2018 11:58 | 113.1 |
| 10/3/2018 11:59 | 110.6 |
| 10/3/2018 12:00 | 111.7 |
| 10/3/2018 12:01 | 112.6 |
| 10/3/2018 12:02 | 110.5 |
| 10/3/2018 12:03 | 113.2 |
| 10/3/2018 12:04 | 110.8 |
| 10/3/2018 12:05 | 108.6 |
| 10/3/2018 12:06 | 106.6 |
| 10/3/2018 12:07 | 107.4 |
| 10/3/2018 12:08 | 110.6 |
| **AVG Run 3** | **110.6** |
| 10/3/2018 12:09 | 8.0 |
| 10/3/2018 12:10 | 1.2 |
| 10/3/2018 12:11 | 18.7 |
| 10/3/2018 12:12 | 109.7 |
| 10/3/2018 12:13 | 95.6 |
| 10/3/2018 12:14 | 99.3 |
| 10/3/2018 12:15 | 97.9 |
| 10/3/2018 12:16 | 13.1 |
| 10/3/2018 12:17 | 1.3 |
| 10/3/2018 12:18 | 0.0 |

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***OF THIS REPORT***

**Georgia Department of Natural Resources**
**Environmental Protection Division • Air Protection Branch**
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Judson H. Turner, Director

GAEPD RECOMMENDED EMISSION FACTORS FOR WOOD PELLET MANUFACTURING

| Emission Source | Uncontrolled Emission Factor | Basis of Emission factor | Control Device |
|---|---|---|---|
| Rotary Dryer Direct wood fired processing green softwood | 6.0 lb/ODT for VOC | AP-42 Table 10.6.2-3 SCC 3-07-006-25 (Adjusted) | If emissions are routed to the dryer with WESP/RTO controls use 95% DRE for VOC and HAP |
| | 5.3 lb/ODT for CO | AP-42 Table 10.6.1-2 SCC3-07-010-09 | |
| | 2.7 lb/ODT for NOx | AP-42 Table 10.6.2-2 SCC 3-07-006-25 | |
| | 2.2 lb/ODT for PM total | AP-42 Table 10.6.2-1 SCC 3-07-006-25 | |
| | 1.1 lb/ODT for PM Condensible | AP-42 Table 10.6.2-1 SCC 3-07-006-25 | |
| | 0.11 lb/ODT for Acetaldehyde | AP-42 Table 10.6.2-3 SCC 3-07-006-25 (Adjusted) | |
| | 0.14 lb/ODT for Formaldehyde | AP-42 Table 10.6.2-3 SCC 3-07-006-25 | |
| | 0.11 lb/ODT ton for Methanol | AP-42 Table 10.6.2-3 SCC 3-07-006-25 | If WESP is used for PM control use 70% removal efficiency for HCl (pH of the water needs to be monitored and maintained) |
| | 1.9 E-02 lb/MM Btu for HCl | AP-42 Table 1.6-3 | |
| Hammermill | 2.5 lb VOC/ton product | Georgia Biomass Testing | If emissions are routed to dryer 90 % DRE for VOC and HAP |
| | 0.004 lb/ton of product for Acetaldehyde | Georgia Biomass- prorated from Pellet Cooler testing | |
| | 0.008 lb/ton of product for Formaldehyde | Georgia Biomass-prorated from Pellet Cooler testing | If emissions are routed to RTO use 95 % DRE for VOC and HAP. . |
| | 0.004 lb/ton for Methanol | Georgia Biomass-prorated from Pellet Cooler testing | |

| **Emission Source** | **Uncontrolled Emission Factor** | **Basis of Emission factor** | **Control Device** |
|---|---|---|---|
| Pelletizer/Pellet Cooler (without Steam injection or extraction) | 0.5 lb VOC/ton of Product | Georgia Biomass Testing | If emissions are routed to dryer 90 % DRE for VOC and HAP |
| | 0.001 lb/ton of product for Acetaldehyde | Georgia Biomass Testing | |
| | 0.002 lb/ton of product for Formaldehyde | Georgia Biomass Testing | If emissions are routed to RTO use 95 % DRE for VOC and HAP. |
| | 0.001 lb/ton of product for Methanol | Georgia Biomass Testing | |
| Pelletizer/Pellet Cooler (with Steam injection) | 1.3 lb VOC/ton of product | Georgia Biomass Testing | If emissions are routed to dryer 90 % DRE for VOC and HAP |
| | 0.002 lb/ton of product for Acetaldehyde | Georgia Biomass- prorated from Pellet Cooler testing | |
| | 0.004 lb/ton of product for Formaldehyde | Georgia Biomass- prorated from Pellet Cooler testing | If emissions are routed to RTO use 95 % DRE for VOC and HAP. |
| | 0.002 lb/ton of product for Methanol | Georgia Biomass- prorated from Pellet Cooler testing | |
| Storage/Handling | 0.4 lb VOC/ton of product | Georgia Biomass Testing | If emissions are routed to dryer 90 % DRE for VOC and HAP |
| | 0.001 lb/ton of product for Acetaldehyde | Georgia Biomass- prorated from Pellet Cooler testing | |
| | 0.002 lb/ton of product for Formaldehyde | Georgia Biomass- prorated from Pellet Cooler testing | If emissions are routed to RTO use 95 % DRE for VOC and HAP |
| | 0.001 lb/ton of product for Methanol | Georgia Biomass- prorated from Pellet Cooler testing | |

Note: These are GAEPD recommended emission factors. Use of these emission factors does not guarantee compliance with all state and federal regulations

# WOOD AND CHIP HANDLING
in Kraft Pulp and Paper Mills
April 1, 1995

**Cutting** is the process of cutting the long logs into usable segments. Generally, logs are cut into 'long' segments or 'short' segments, depending on the requirements of the barkers and chippers. Both long and short segments may be utilized at the same facility.

*BACT*: Utilization of water (or equivalent) as necessary to prevent nuisance conditions.

**Barking**. The most common type of barking involves a horizontal rotating drum into which the cut logs are placed. The motion of the logs and the drum separate the bark from the log, and the bark falls through slits in the side of the drum to a conveyor system. The bark is then stockpiled for use in the power boiler. The logs are sent to storage to await chipping.

*BACT*: Utilization of water (or equivalent) as necessary to prevent nuisance conditions.

**Chipping** sizes the logs into small chips that are suitable for cooking in the digestors. This is most often accomplished by pushing the log segments onto a rotating disc with blades. The chips pass through to a conveyor and are carried to a scalping screen to remove oversize material.

*BACT*: Utilization of water (or equivalent) as necessary to prevent nuisance conditions.

**Storage** of the chips is usually in well maintained stockpiles that have automated feed systems (augers or other equipment) to load conveyors. Usually, a bulldozer is at work maintaining the proper shape of the pile to allow the augers to function properly.

*BACT*: Utilization of water (or equivalent) as necessary to prevent nuisance conditions.

**Screening** of the chipped material from the stockpiles removes the fines (sawdust) and sends the material to the power boiler. The accepted material is conveyed to the digestors. Oversize is usually sent to a rechipper for size reduction.

*BACT*: Utilization of water (or equivalent) as necessary to prevent nuisance conditions.

## FEDERAL REGULATIONS

None of the above facilities is subject to NSPS, nor is any NESHAPS contaminant present in the emissions.

Kraft pulp mills are a named source, so all emissions (including fugitives) are subject to PSD regulations and nonattqinment review in nonattainment areas. Particulate matter is subject to the NAAQS (150• g/m$^3$ / 50• g/m$^3$). A MACT standard should be promulgated by the EPA in the Spring of 1996 that regulates Kraft pulp and paper mills and may affect the wood and chip handling operations. Probably all of the Texas Kraft mills will be subject to Title V permitting after its implementation.

## STATE REGULATION

These facilities are subject to Regulation VI, and particulate matter is subject to Regulation I. The state has been delegated the authority to implement the federal PSD and nonattainment programs.

## OTHER REQUIREMENTS

Effects Screening Levels (ESLs) will be used when applicable during a permit review. Note that pinene is based on an odor threshold, which will be considered when reviewing impacts.

| Particulate | ESL[f] |
|---|---|
| Hardwood | 10• g/m$^3$ |
| Softwood | 50• g/m$^3$ |
| Volatile Organics | |
| (•,•) Pinene[g] | 64• g/m3 |

## EMISSION FACTORS FOR WOOD AND CHIP HANDLING

| Emission Point | Factor[e] | Reference |
|---|---|---|
| Cutting (PM) | 0.1050 $^{lb\ PM}/_{ton}$ | AP-42 10.3-1[a] |
| Barker (PM) | 0.0072 $^{lb\ PM}/_{ton}$ | AP-42 10.3-1[a] |
| Chipping (PM) | 0.00003 $^{lb\ PM}/_{ton}$ | AP-42 8.19.2[b] |
| Stockpiles (PM) | 3.9600 $^{lb}/_{acre}/_{day}$ | AP-42 8.19.1-1[c] |
| Screening (PM) | 0.0084 $^{lb\ PM}/_{ton}$ | TNRCC[b] |
| Conveyors (PM) | variable | material handling guidance sheet |

| Stockpiles (VOC) | | |
|---|---|---|
| Hardwood | negligible | TNRCC |
| Softwood | (0.00343)x(24.5)x(chips)x(RT) lb $^{VOC}/_{day}$ | TNRCC[d] |

where: 24.5= lb turpentine/ton of softwood
chips= ton of softwood processed/day
RT= Average residence time in days (<14 days)

Notes:

(a)The factors include 70% control for high moisture content
(b)These factors were based on numbers derived from the new rock crusher numbers published by EPA. The material moisture is included in the factor. (see Rock Crusher Standardized Packet, TNRCC).
(c)Based on active stockpiles and 70% control for moisture content.
(d)Derived from "Sulfate Turpentine Recovery", Pulp Chemicals Association, 1971. Assumes a linear loss of turpentine over the inital two weeks of residence time. Also estimates turpentine • 100% of VOCs

(e)These factors are subject to change as more information becomes available.
(f)Taken from the April 1, 1994, ESL list (TNRCC). The ESLs are subject to change.
(g)ESL is based on odor threshold (<u>Handbook of Environmental Data on Organic Chemicals</u>, 2nd edition, Karel Verschueren, Van Nostrand Reinhold Co., Inc, NY, 1983). Health threshold is 2,000• g/m$^3$ for turpentine.