GREENHOUSE GAS MONITORING PLAN

PREPARED IN ACCORDANCE WITH 40 CFR PART 98

Filer City, MI Mill

Prepared by:

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1. INTRODUCTION

Packaging Corporation of America (PCA) owns and operates a corrugating medium manufacturing facility located in Filer City, Manistee County, Michigan (Filer City Mill, or Mill). The Filer City Mill is subject to the requirements of the U.S. Environmental Protection Agency (U.S. EPA) Mandatory Reporting of Greenhouse Gas (GHG) Rule that is codified at 40 CFR Part 98. The GHG reporting rule applies to facilities such as the Filer City Mill that emit GHG in excess of 25,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) annually. As of January 1, 2010, the Filer City Mill is required to inventory its annual GHG emissions and to report those emissions and provide supporting information to the U.S. EPA by March 31st of each subsequent year, or as prescribed by U.S. EPA. Included as part of the GHG reporting rule is the requirement to prepare and maintain this GHG Monitoring Plan.

This GHG Monitoring Plan provides specific information regarding the applicability of the GHG reporting rule to the Filer City Mill and documents how the Mill will manage its GHG inventory and reporting program. This GHG Monitoring Plan identifies the quality assurance/quality control procedures (QA/QC) that are followed as part of the inventorying and reporting of data, and outlines the specific methodology that the Mill will follow in the calculation of the GHG emissions. This GHG Monitoring Plan includes the following sections:

- Section 2: Filer City Mill Description and Applicability of 40 CFR Part 98.
- Section 3: Approach to GHG Calculations.
- Section 4: QA/QC.
- Section 5: Data Reporting and Archiving.

The Filer City Mill has prepared this GHG Monitoring Plan to be consistent with the requirements of 40 CFR Part 98. In addition, the Filer City Mill has reviewed guidance documents that were prepared by U.S. EPA in response to industry's questions and comments related to the GHG reporting rule. The Filer City Mill has incorporated the U.S. EPA guidance into the GHG Monitoring Plan as appropriate. This GHG Monitoring Plan also reflects existing Mill QA/QC documents and Mill operating practices. As necessary, the GHG Monitoring Plan will be updated and will continue to be a usable document that can be referenced by the appropriate Mill personnel to ensure that all inventorying, reporting, and QA/QC activities that are associated with the GHG reporting rule are completed correctly.

2. MILL DESCRIPTION AND APPLICABILITY OF 40 CFR PART 98

This section of the GHG Monitoring Plan provides a general description of the Filer City Mill and discusses the applicability of the various subparts of 40 CFR Part 98. The Mill recognizes that additional operations at the Mill could become subject to subparts of the rule that were not promulgated as of December 2017. The Filer City Mill will update this section and other sections of the monitoring plan as future rulemaking warrants.

2.1 MILL DESCRIPTION

The Mill operates two identical continuous tube-type digesters that operate in parallel to produce wood fibers (pulp) from wood chips. The digesters are pressurized with steam and the chip feed forms a plug flow into the system. Each digester tube has an internal screw that controls the rate at which the chips move through the tube. Pressure in each digester "blows" the cooked chips out of the last tube, through separate defibrators, and then through blow lines to the blow tower. In the defibrators, the chips pass between refiner plates, one rotating and one stationary. The defibrators mechanically reduce the chips to fiber bundles. This mechanical action is a necessary part of the pulping process; hence it is referred to as a semi-chemical process because it is also semi-mechanical.

Steam and other vapor from the blow tower pass through a cyclone separator to remove entrained pulp and liquid, and then pass on through a direct contact condenser. The non-condensable gases (NCG) leaving the blow tower are routed from the condenser to the low volume high concentration (LVHC) collection system where they are thermally oxidized in either EUBOILER1 (Boiler No. 1) or EUBOILER2 (Boiler No. 2). These two boilers, along with a third boiler, EUBOILER4A (Boiler No. 4A), produce steam for Mill operations.

Pulp collected in the blow tower is washed with process water to rinse the spent cooking liquors from the pulp. The spent cooking liquor collected in the washing process is called black liquor. The Filer City Mill currently utilizes two rotary pulp washers operating in series. Each washer is designed with a total enclosure system. Gases are collected from the washers and routed to Boilers No. 1 and 2 for destruction via the LVHC collection system.

The black liquor that is washed from the pulp contains wood lignin and may also contain recoverable chemicals. The black liquor is sent to the recovery area. In the recovery area, the weak black liquor is sent to evaporator systems where water is driven off and it is concentrated into heavy black liquor, and ultimately spent liquor solids. The spent liquor solids are fired in EUCOPELAND (Copeland Reactor) where non-combustible chemicals are recovered for re-use in the pulping process.

The washed pulp is sent to the paper mill. Polished whitewater from the paper machines is biologically treated in the biogas system before being sent to the Mill's wastewater treatment plant. A byproduct of this biological treatment process is the generation of methane-rich biogas that is scrubbed and then fired in EUBOILER2 and/or EUBOILER4A, or EUBIOGASFLARE.

A list of the combustion and process emissions units at the Mill that are subject to 40 CFR Part 98 is provided in Table 2-1. A brief description of each emissions unit is also provided in Section 3.

2.2 RULE APPLICABILITY

Pursuant to §98.2(a)(2), the applicability of 40 CFR Part 98 is triggered when the actual annual emissions of GHG gases from all covered sources meets or exceeds a 25,000 $MTCO_2e$ threshold. To assess a facility's GHG emissions against the 25,000 $MTCO_2e$ threshold, annual emissions of the six GHG gases for which calculation methodologies are provided in 40 CFR Part 98 must be summed. The six GHG gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF_6). Since each GHG has a different Global Warming Potential (GWP), each GHG must be normalized to the GWP of CO_2. Consequently, CH_4 emissions are multiplied by 25 and N_2O emissions are multiplied by 298 to equate to CO_2 equivalent emissions. Biogenic emissions of CO_2 are not included in the emissions total to determine applicability of 40 CFR Part 98; however, biogenic CO_2 emissions must be reported if the 25,000 $MTCO_2e$ threshold is triggered.

Table 2-1
Process and Combustion Units Subject to 40 CFR Part 98
Packaging Corporation of America - Filer City, MI Mill

Emission Unit Name	Unit Type	Fuel/Throughput Type
EUBOILER1	Combustion	Natural Gas
EUBOILER2	Combustion	Natural Gas, Biogas
EUBOILER4A	Combustion	Natural Gas, Biogas
EUBIOGASFLARE	Combustion	Biogas, Propane
WWTP Building	Combustion	Propane
EUCOPELAND	Process and Combustion	Natural Gas, Spent Liquor Solids (Hardwood)
Biogas Reactor	Process	Polished Paper Machine Whitewater

The Filer City Mill has reviewed 40 CFR Part 98 and determined which sections of the rule apply to the Mill. There are three specific sections of 40 CFR Part 98 that currently apply to the Filer City Mill. Subpart A of 40 CFR Part 98 contains general provisions and definitions that apply to all industrial facilities. Subpart C includes requirements for combustion sources. As a pulp and paper mill, the Filer City Mill is further subject to the requirements of 40 CFR Part 98, Subpart AA (Pulp and Paper Manufacturing) and as an industrial facility with an anaerobic wastewater treatment process the Mill is subject to 40 CFR Part 98, Subpart II (Industrial Wastewater Treatment). A summary of the applicable Part 98 rules is listed in Table 2-2.

In addition, the following subsections have been identified as being potentially applicable to pulp and paper mills: Subpart U (Miscellaneous Uses of Carbonate), and Subpart TT (Industrial Waste Landfills). Subpart U does not apply to the Mill since the source category does not apply to equipment that uses carbonates or carbonate-containing minerals that are consumed in the production of pulp and paper. Subpart TT does not apply since an on-site landfill is not located at the Filer City Mill.

In general, the applicability of 40 CFR Part 98 requires that the Mill quantify fossil fuel combustion-related and process-related emissions of CO_2, N_2O, and CH_4. For biomass materials that are combusted or processed, the Mill also needs to calculate the biogenic CO_2, N_2O, and CH_4 emissions. The fossil fuel and biogenic GHG emissions must be reported on a facility-wide basis, as well as on an individual emissions unit(s) basis for those sources not electing to take advantage of any reporting alternatives available at §98.36(c). The individual totals of GHG must be speciated (i.e., annual tons of CO_2, N_2O, and CH_4).

Table 2-2
Applicability of 40 CFR Part 98
Packaging Corporation of America - Filer City, MI Mill

Subpart	Citation	Citation Title
Subpart A - General Provisions	§98.1	Purpose and Scope
	§98.2	Who must report?
	§98.3	What are the general monitoring, reporting, recordkeeping, and verification requirements of this part?
	§98.4	Authorization and Responsibilities of the Designated Representative
	§98.5	How is the report submitted?
	§98.6	Definitions
	§98.7	What standardized methods are incorporated by reference into this part?
	§98.8	What are the compliance and enforcement provisions of this part?
	§98.9	Addresses
Subpart C - General Stationary Fuel Combustion Sources	§98.30	Definition of the source category
	§98.31	Reporting threshold
	§98.32	GHGs to report
	§98.33	Calculating GHG emissions
	§98.34	Monitoring and QA/QC requirements
	§98.35	Procedures for estimating missing data
	§98.36	Data reporting requirements
	§98.37	Records that must be retained
	§98.38	Definitions
Subpart AA - Pulp and Paper Manufacturing	§98.270	Definition of Source Category
	§98.271	Reporting threshold
	§98.272	GHGs to report
	§98.273	Calculating GHG emissions
	§98.274	Monitoring and QA/QC requirements
	§98.275	Procedures for estimating missing data
	§98.276	Data reporting requirements
	§98.277	Records that must be retained
	§98.278	Definitions
Subpart II - Industrial Wastewater Treatment	§98.350	Definition of Source Category
	§98.351	Reporting threshold
	§98.352	GHGs to report
	§98.353	Calculating GHG emissions
	§98.354	Monitoring and QA/QC requirements
	§98.355	Procedures for estimating missing data
	§98.356	Data reporting requirements
	§98.357	Records that must be retained
	§98.358	Definitions

3. APPROACH TO GHG CALCULATIONS

This section of the GHG Monitoring Plan describes the approach that the Mill will follow to determine and report the annual GHG emissions that are generated by combustion and process sources. As part of the approach, the Mill has evaluated the ability to streamline the reporting process by using guidance and reporting options provided by U.S. EPA (e.g., aggregation of emissions units). The supporting information and the calculation approach that is utilized for reporting purposes under Part 98 are identified in the following subsections.

3.1 GENERAL CO_2 CALCULATION PROCEDURES

The procedures related to determining GHG emissions include calculation methodologies for determining CO_2 emissions as well as CH_4 and N_2O emissions. For CO_2 emissions from combustion sources, there are four different tiers of calculations which can be used: Tier 1, Tier 2, Tier 3, and Tier 4. The use of a particular tier is determined by the size of the emissions unit, the type of fuel combusted, the use of a Continuous Emissions Monitoring System (CEMS), and to a degree, the preference of the facility. Different tiers can be used for different fuels on the same emissions unit. GHG emissions do not need to be calculated for emissions units that meet the definition of portable or emergency generators/equipment as defined at 40 CFR §98.6. Additionally, GHG emissions from flares do not need to be considered per Subpart C unless required by another subpart. A brief description of each tier is provided in the following paragraphs.

The Tier 1 CO_2 calculation methodology uses a default fuel-specific high heating value (HHV), a default fuel-specific CO_2 emission factor, and an annual amount of fuel combusted. The Tier 1 calculation methodology can only be used for those fuels for which default HHV and CO_2 values are provided under 40 CFR Part 98. Generally, if an emissions unit's heat input capacity is greater than 250 million British Thermal Units per hour (MMBtu/hr), or if HHV values for combusted fuels are routinely obtained at the minimum frequency established in §98.34, or at a greater frequency, then the Tier 1 CO_2 calculation methodology <u>may not</u> be used. However, pursuant to amendments dated November 29, 2013, Tier 1 may be used for the combustion of a fuel listed in Table C-1 if the fuel is combusted in a unit with a maximum rated heat input capacity greater than 250 MMBtu/hr (or, pursuant to §98.36(c)(3), a group of units served by a common supply pipe, having at least one unit with a maximum rated heat input capacity greater than 250 MMBtu/hr), provided that both of the following conditions apply:

1) The use of Tier 4 is not required.
2) The fuel provides less than 10 percent of the annual heat input to the unit, or if §98.36(c)(3) applies, to the group of units served by a common supply pipe.

The Tier 2 CO_2 calculation methodology is similar to the Tier 1 approach except that HHV values are used that are specific to the facility or emissions unit. The Tier 2 CO_2 calculation methodology can be used for emissions units greater than 250 MMBtu/hr only if pipeline quality natural gas or distillate fuel oil is used to fire these large emissions units.

The Tier 3 CO_2 calculation methodology is a refinement on Tiers 1 and 2 and incorporates a fuel-specific measured carbon content (CC) and molecular weight of the fuel. The Tier 3 CO_2 calculation methodology may be used for an emissions unit regardless of the heat input rating and will be used for a unit maximum rated heat input capacity greater than 250 MMBtu/hr that combusts any type of fuel listed in Table C-1 of the rule (except Municipal Solid Waste), unless the use of Tier 1 or 2 is permitted or the use of Tier 4 is required. Tier 3 will also be used for a fuel not listed in Table C-1 of the rule if the fuel is combusted in a unit with a maximum rated heat input capacity greater than 250 MMBtu/hr (or in a group of units served by a common supply pipe, having at least one unit with a maximum rated heat input capacity greater than 250 MMBtu/hr), provided that the use of Tier 4 is not required and the fuel provides 10% or more of the annual heat input to the unit or the group of units served by a common supply pipe. Tier 3 is also required when use of the tier is specified in another subpart, regardless of the unit's size.

The Tier 4 CO_2 calculation methodology must be used if the emissions unit fulfills each of the following six criteria cited at §98.33(b)(4), which reflects the use of CEMS measurements:

1) The unit has a maximum rated heat input capacity greater than 250 MMBtu/hr, or if the unit combusts municipal solid waste and has a maximum rated input capacity greater than 600 tons per day of MSW.

2) The unit combusts solid fossil fuel or MSW as the primary fuel.
3) The unit has operated for more than 1,000 hours in any calendar year since 2005.
4) The unit has installed CEMS that are required either by an applicable Federal or State regulation or the unit's operating permit.
5) The installed CEMS include a gas monitor of any kind or a stack gas volumetric flow monitor, or both and the monitors have been certified, either in accordance with the requirements of 40 CFR Part 75, Part 60 of this chapter, or an applicable State continuous monitoring program.
6) The installed gas or stack gas volumetric flow rate monitors are required, either by an applicable Federal or State regulation or by the unit's operating permit, to undergo periodic quality assurance testing in accordance with either Appendix B to 40 CFR Part 75, Appendix F to 40 CFR Part 60, or an applicable State continuous monitoring program.

3.2 GENERAL CH_4 AND N_2O CALCULATION PROCEDURES

There are no specific calculation tiers associated with determining the annual emissions of CH_4 and N_2O. The calculation tier that is used for calculating emissions of CO_2 determines the equation to be used for calculating emissions of CH_4 and N_2O. In all cases for CH_4 and N_2O, U.S. EPA emissions factors are used in the calculations.

3.3 CALCULATION AND REPORTING ALTERNATIVES

U.S. EPA provides calculation and reporting alternatives at §98.36(c) for certain configurations of stationary fuel combustion units. Certain facilities may be able to calculate and report GHG emissions for two or more qualified units on a combined basis if the units either combust common fuel(s), are served by the same fuel supply line or pipe, or share a monitored stack. These reporting alternatives are discussed in detail below.

3.3.1 Aggregation of Units

The Aggregation of Units reporting alternative at §98.36(c)(1) may be utilized by facilities containing two or more combustion units, each of which has a maximum rated heat input capacity of 250 MMBtu/hr or less, provided that Tier 4 is not required or elected for any of the units and the units use the same tier for any common fuels combusted. The Filer City Mill takes advantage of the Aggregation of Units Approach in accordance with 40 CFR §98.36(c)(1). A list of the emissions units that the Mill reports GHG emissions according to the Aggregation of Units Approach along with each unit's heat input rating are provided in Table 3-1. The following subsections, which are organized according to fuel type, discuss the calculation tier methodologies and general monitoring requirements which apply to each group of aggregated units listed in Table 3-1.

3.3.1.1 Natural Gas

The Filer City Mill operates multiple natural gas-fired stationary combustion sources that utilize the Aggregation of Units Approach. Each of these units has a maximum rated heat input capacity of 250 MMBtu/hr or less. These units are supplied purchased natural gas via two independent supply lines that are each equipped with a unique fuel billing meter. As listed in Table 3-1, the natural gas-fired sources reporting under the Aggregation of Units Approach are identified as Group ID GP-001 and include EUBOILER1 (Boiler No. 1), EUBOILER2 (Boiler No. 2), and EUBOILER4A (Boiler No. 4A).

Since the Mill receives HHV data from each of the respective natural gas distribution companies at a frequency that meets the requirements of 40 CFR §98.34(a)(2)(i) (i.e., at least semi-annually), the Tier 2 calculation methodology is utilized to calculate GHG emissions for GP-001. The Mill determines the annual throughput of natural gas to the GP-001 aggregated source group in accordance with the Tier 2 requirements of §98.33(a)(2)(i), which in this case consists of monthly fuel billing meter records. In accordance with §98.33(a)(2)(ii)(A), the Mill determines the weighted annual average HHV of natural gas fired by GP-001 based upon measured HHV data that is received at least semi-annually and the natural gas throughput of GP-001 during each sample period.

A summary of the specific equations that are used to calculate GHG due to firing natural gas in GP-001, as well as example calculations for each type of GHG, are provided in Table 3-2.

3.3.1.2 Biogas

The Filer City Mill operates biogas-fired stationary combustion sources that each have a maximum rated heat input capacity of 250 MMBtu/hr or less, and utilizes the Aggregation of Units Approach. As listed in Table 3-1, the biogas-fired sources reporting under the Aggregation of Units Approach are identified as Group ID GP-002 and include Boiler No. 2, Boiler No. 4A, and EUBIOGASFLARE (Biogas Flare).

Since the Mill does not receive HHV data at a frequency that meets the requirements of 40 CFR §98.34(a)(2)(iii) (i.e., at least once per calendar quarter), the Tier 1 calculation methodology is utilized to calculate GHG emissions for GP-002. In accordance with the Tier 1 requirements of §98.33(a)(1)(i), the facility determines the annual throughput of biogas fired by GP-002 based on company records. Company records, in the case of GP-002, are quality-assured readings via Mill-owned fuel flow meters.

A summary of the specific equations that are used to calculate GHG due to firing biogas in GP-002, as well as example calculations for each type of GHG, are provided in Table 3-3.

3.3.2 Monitored Common Stack or Duct Configurations

The Monitored Common Stack or Duct Configuration approach at 40 CFR §98.36(c)(2) may be utilized when the gases from two or more stationary fuel combustion units at a facility are combined together in a common stack or duct before exiting to the atmosphere and if a CEMS is used to continuously monitor CO_2 mass emissions at the common stack or duct according to the Tier 4 Calculation Methodology. Although Boiler No. 1 and Boiler No. 2 share a common stack, a CEMS does not continuously monitor CO_2 mass emissions at this common stack. Therefore, this reporting alternative is not utilized for Boiler No. 1 and Boiler No. 2, or any other sources at the Mill.

3.3.3 Common Pipe Configurations

The Common Pipe Configuration approach at 40 CFR §98.36(c)(3) may be utilized for emissions units that are supplied a gaseous or liquid fuel via a common pipe, provided that the total amount of fuel combusted by the units is accurately measured at the common pipe or supply line using a fuel flow meter (or, for natural gas, the amount of fuel combusted may be obtained from gas billing records), and there is no requirement for those units to use a Tier 4 CO_2 calculation methodology (see Section 3.1). Although the local natural gas distribution companies deliver natural gas to the Filer City Mill via two common pipelines and the billing records from these local distribution companies are used to determine natural gas throughput, the Mill has elected to report GHG emissions from certain natural gas-fired sources according to the Aggregation of Units approach in lieu of the Common Pipe Configuration approach.

3.4 SUBPART C INDIVIDUAL EMISSIONS UNIT CALCULATIONS

U.S. EPA provides calculation methodologies for stationary fuel combustion units at §98.33 and for pulp and paper manufacturing process sources at §98.273. A list of the Mill's individual combustion emissions units and process emissions units that are subject to 40 CFR Part 98 is provided in Table 2-1. These emissions units are discussed in further detail below.

3.4.1 EUBOILER1

EUBOILER1 (Boiler No. 1) is fired with multiple fuels and has a heat input rating of 240 MMBtu/hr. The only gaseous fuel that is fired in Boiler No. 1 is natural gas, which is accounted for under Aggregated Source Group GP-001. The calculations that the Mill uses to determine CO_2, CH_4, and N_2O emissions from Aggregated Source Group GP-001 are provided in Tables 3-2 and 3-4.

The Mill is permitted to fire coal in Boiler No. 1; however, coal is not currently combusted at the Mill due to Boiler Maximum Achievable Control Technology (MACT) compliance considerations (as per 40 CFR Part 63, Subpart DDDDD). The Mill is also permitted to fire No. 6 fuel oil and biogas in Boiler No. 1; however, Boiler No. 1 is not currently physically capable of firing either of these fuels. This GHG Monitoring Plan will be updated in the future should Boiler No. 1 commence firing of either coal, No. 6 fuel oil, or biogas.

3.4.2 EUBOILER2

EUBOILER2 (Boiler No. 2) is fired with multiple fuels and has a heat input rating of 186 MMBtu/hr. The gaseous fuels combusted in Boiler No. 2 are natural gas and biogas, where firing of natural gas is accounted for under Aggregated Source Group GP-001 and firing of biogas is accounted for under Aggregated Source Group GP-002. The calculations that the Mill uses to determine CO_2, CH_4, and N_2O emissions associated with natural gas combustion under Aggregated Source Group GP-001 are provided in Tables 3-2 and 3-5. The calculations that the Mill uses to determine CO_2, CH_4, and N_2O emissions associated with biogas combustion under Aggregated Source Group GP-002 are provided in Tables 3-3 and 3-5.

The Mill is permitted to fire coal in Boiler No. 2; however, coal is not currently combusted at the Mill due to Boiler MACT compliance considerations. The Mill is also permitted to fire No. 6 fuel oil in Boiler No. 2; however, Boiler No. 2 is not currently physically capable of firing this fuel.

The GHG Monitoring Plan will be updated in the future should Boiler No. 2 commence firing of coal or No. 6 fuel oil.

3.4.3 EUBOILER4A

EUBOILER4A (Boiler No. 4A) is fired with multiple fuels and has a heat input rating of 227 MMBtu/hr. Boiler No. 4A does not fire solid or liquid fuel; the gaseous fuels combusted are natural gas and biogas.

The calculations that the Mill uses to determine CO_2, CH_4, and N_2O emissions associated with natural gas combustion under Aggregated Source Group GP-001 are provided in Tables 3-2 and 3-6. The calculations that the Mill uses to determine CO_2, CH_4, and N_2O emissions associated with biogas combustion under Aggregated Source Group GP-002 are provided in Tables 3-3 and 3-6.

3.4.4 EUBIOGASFLARE

EUBIOGASFLARE (Biogas Flare) is used to burn biogas when Boiler No. 2 and Boiler No. 4A are not operating. The Biogas Flare has a heat input rating of 97 MMBtu/hr. The gaseous fuels combusted are biogas and a small amount of propane for the pilot burner. However, emissions from the pilot burner are exempt from reporting per 40 CFR §98.30(b)(4). The calculations that the Mill uses to determine CO_2, CH_4, and N_2O emissions associated with biogas combustion under Aggregated Source Group GP-002 are provided in Tables 3-3 and 3-7.

3.4.5 WWTP Building

A variety of small propane-fired combustion sources exist in the WWTP Building. Approximately 80% of this combustion is used to prevent waterlines and chemicals within the WWTP Building from crystallizing. The remaining combustion provides heat to the laboratory. Each combustion source within the WWTP Building has a heat input of less than 250 MMBtu/hr. The Mill utilizes the Tier 1 calculation methodology to calculate GHG emissions associated with the combustion of propane in the WWTP Building. In accordance with the Tier 1 requirements of §98.33(a)(1)(i), the Mill utilizes default values provided in 40 CFR Part 98 for HHV and determines the annual throughput of propane to the WWTP Building based on company records. Company records, in this case, consist of purchase records. The calculations that the Mill uses to determine CO_2, CH_4, and N_2O emissions, as well as example calculations using representative data for the WWTP Building, are provided in Table 3-8.

3.5 SUBPART AA INDIVIDUAL EMISSIONS UNIT CALCULATIONS

The procedures related to determining GHG emissions from pulp and paper mill process units under 40 CFR Part 98, Subpart AA include calculation methodologies for determining CO_2 emissions as well as CH_4 and N_2O emissions. At the Filer City Mill, the Copeland Reactor is the only emissions unit that is subject to 40 CFR Part 98, Subpart AA. In addition, the Filer City Mill adds sodium carbonate (Na_2CO_3) to the pulp for pH control and therefore triggers the requirements associated with 40 CFR §98.273(d).

3.5.1 EUCOPELAND

EUCOPELAND (Copeland Reactor) fires spent liquor solids derived from hardwood to recover pulping chemicals and is considered a "chemical recovery combustion unit at a stand-alone semi-chemical facility" under Subpart AA. The Copeland Reactor is capable of firing up to 50,000 lbs spent liquor solids/hr and has a rated heat input of 178.3 MMBtu/hr. All CO_2 emissions from black liquor solids (BLS) firing are biogenic. To calculate CO_2 emissions associated with the combustion of spent liquor solids in the Copeland Reactor, the Mill analyzes the CC of the spent liquor solids at least annually and monitors the mass of spent liquor solids fired using an online measurement system. To calculate CH_4 and N_2O emissions associated with the combustion of spent liquor solids in the Copeland Reactor, the Mill analyzes the HHV of the spent liquor solids at least annually and monitors the mass of spent liquor solids fired using an online measurement system. Per 40 CFR §98.273(b), as a stand-alone semichemical facility, PCA calculates CH_4 and N_2O emissions using default CH_4 and N_2O emissions factors for Kraft facilities in Table AA-1 of the rule.

Emissions from the Copeland Reactor are controlled by a natural gas-fired thermal oxidizer, which has a rated heat input of 50 MMBtu/hr. For start-up, shut-down, and load stabilization, the Copeland Reactor also fires natural gas.

Per 40 CFR §98.273 to Subpart AA, the Filer City Mill uses a Subpart C Tier 2 CO_2 calculation methodology, and the corresponding Subpart C calculation methodology for CH_4 and N_2O, to calculate natural gas combustion-related GHG emissions for the Copeland Reactor. Company records (i.e., from quality-assured natural gas fuel flow meters) are used to measure the volume of natural gas fired by the Copeland Reactor and thermal oxidizer.

A summary of the specific calculation methodologies and equations that are used for the Copeland Reactor with thermal oxidizer control, along with example calculations, are provided in Table 3-9.

3.5.2 Carbonate Make-up Chemical Usage

Under Subpart AA, the amount of carbonate make-up chemical usage per year must be determined. As indicated in Section 3.5, the Mill currently purchases Na_2CO_3 for use in the digesters for pH control. However, Calcium carbonate ($CaCO_3$) is not currently added to the Mill's pulping process. A summary of the specific equations that are used to calculate emissions of GHG due to carbonate make-up chemical usage is provided in Table 3-10.

3.6 SUBPART II INDIVIDUAL EMISSIONS UNIT CALCULATIONS

The procedures related to determining GHG emissions from industrial wastewater treatment plants under 40 CFR Part 98, Subpart II include calculation methodologies for determining CH_4 emissions. At the Filer City Mill, the Biogas Reactor is the only emissions unit that is subject to 40 CFR Part 98, Subpart II.

3.6.1 Biogas Reactors

The Mill's biogas generation system consists of a pre-acidification tank, a recycle/rapid mix tank, bioreactors, a biogas holder, a sludge tank, feed tanks, a biogas collection system with scrubber, and a sludge system. The bioreactors (Biogas Reactors) are considered anaerobic wastewater treatment reactors because they treat polished whitewater from the paper machines prior to being sent to the actual wastewater treatment plant. The actual wastewater treatment plant does not contain any anaerobic processes that are subject to Subpart II.

To quantify CH_4 emissions associated with the anaerobic treatment of polished whitewater, PCA Filer City monitors and records the following:

- Cumulative weekly volume of whitewater sent to Biogas Reactors.
- Weekly Average concentration of whitewater Chemical Oxygen Demand (COD) entering Biogas Reactors.
- Weekly average CH4 concentration of biogas (wet).
- Weekly average temperature at which biogas flow to EUBIOGASFLARE is measured.

- Cumulative weekly volumetric flow of biogas to EUBOILER2 and/or EUBOILER4A and/or EUBIOGASFLARE (wet).

Note that to determine the weekly volumetric flow of biogas to EUBIOGASFLARE, PCA relies upon measurements of biogas flow duration to EUBIOGASFLARE and the assumption that the rate of biogas flow from the reactors to EUBIOGASFLARE (when such flow occurs) is equivalent to the rate of biogas flow to EUBOILER4A during the same period of time. Specifically, PCA first monitors the duration of time that the temperature of EUBIOGASFLARE exceeds 400 degrees Fahrenheit (deg F), and regards temperatures above 400 deg F as biogas flow events to EUBIOGASFLARE. Next, PCA determines what fraction of the month's total hours included times of biogas flow to EUBIOGASFLARE and the fraction of the month's total hours that included times of biogas flow to EUBOILER4A. Once these respective fractions are known, PCA uses the calculated fractions along with the measured flowrate of biogas flow to EUBOILER4A (recorded by a flow meter installed immediately after the reactors and bypass to the flare, but prior to the powerhouse) to calculate the portion of biogas flow that was sent to EUBIOGASFLARE.

A summary of the specific equations that are used for the Biogas Reactors (Equations II-1, II-4, II-5, and II-6), along with example calculations, are provided in Table 3-11.

3.7 EXEMPT SOURCES AND FUELS

The Mill has identified several emissions units and "fuels" that are not required to be part of the GHG reporting program. Currently, the GHG rule exempts emissions units that qualify as portable and as emergency back-up units. The criteria that must be met for a unit to be classified as "portable" or as "emergency back-up" are listed in Table 3-12.

Other emissions units at the Mill that are <u>not</u> required to be included in the GHG reporting program are those sources for which U.S. EPA has not yet established reporting requirements within 40 CFR Part 98. The Mill recognizes that additional operations at the Mill could become subject to subparts of the rule in the future that were not promulgated as of August 2019. The Mill will update the GHG Monitoring Plan as additional source categories applicable to operations at the Mill are regulated.

The GHG reporting rule does not require GHG emissions to be calculated for certain types of fuels. Guidance provided by U.S. EPA exempted non-condensable gases (NCGs), stripper off-gases (SOGs), and concentrated vent gases (CVGs) from being included as fuels for which GHG emissions must be calculated. In addition, fuels not listed in Table C-1 of 40 CFR Part 98 that meet both of the following criteria do not need to be included:

- The fuel is fired in a combustion unit not required to utilize Tier 4 methodology, and
- For Tier 3 units, the fuel supplies less than 10% of the annual heat input to either the emissions unit or a group of emissions units that are reporting according to the common pipe configuration approach.

3.8 PROCEDURES FOR REPLACING MISSING DATA

Summaries of the types of data that the Filer City Mill is required to measure pursuant to 40 CFR Part 98 are included as Table 3-13 through Table 3-17. These summaries may be utilized by the Mill for the purposes of day-to-day recordkeeping activities and for identifying those circumstances when it is necessary to utilize missing data procedures in GHG calculations.

The Mill will use source-specific procedures for replacing missing data. The requirements of 40 CFR §98.35 address missing data related to stationary fuel combustion, the requirements of 40 CFR §98.275 address missing data associated with pulp and paper manufacturing, and the requirements of 40 CFR §98.355 address missing data associated with industrial wastewater treatment. The Filer City Mill recognizes that missing data are due to uncontrollable circumstances and not a failure on the part of the Mill to maintain equipment, to operate equipment properly, to plan for foreseeable problems, or to have personnel follow proper procedures. The missing data procedures apply to required parameters that are subject to some form of QA and are used in the computation of GHG emissions.

U.S. EPA requires additional information to justify and explain the circumstances involving the replacement of missing data. Specifically, annual records will be kept of multiple items, including a list of missing data elements, how missing data were replaced, actions to restore malfunctioning equipment, and actions taken to prevent future malfunctions. Periods of data that are missing due to calibrations and maintenance activities will also be treated as missing data. The Mill will supply the appropriate information concerning missing data as part of the annual GHG inventory submittal.

3.8.1 Missing Data for Stationary Fuel Combustion (Subpart C)

The missing data requirements for stationary fuel combustion apply to two general types of emissions units: emissions units subject to or required to report following the Acid Rain Program (ARP) and emissions units subject to CO_2 calculation methodologies listed at 40 CFR §98.33(a)(1)-(4). The Filer City Mill does not report any emissions in accordance with the Acid Rain Program (ARP); therefore, all emissions units reporting GHG are subject to the missing data procedures related to 40 CFR §98.33(a)(1)-(4).

Emissions units at the Filer City Mill use a combination of Tier 1 and Tier 2 Calculation Methodologies since all of the fuels fired are identified in Table C-1 of 40 CFR Part 98 and there are no CEMS installed. As a result, the types of missing data that could occur are limited to HHV (natural gas) and fuel usage data (natural gas, biogas, and propane).

Missing HHV Data (Subpart C)

The Tier 2 calculation methodology requires that HHV data for each Tier 2 fuel fired be analyzed (by either the supplier or Mill) according to the frequencies and methods provided in §98.34. Per §98.34(a)(2)(1)(i), semi-annual sampling and analysis of natural gas HHV is required (i.e., twice per calendar year, with consecutive samples taken at least four months apart). Since the Mill obtains HHV data directly from its natural gas suppliers, it is not necessary for the Mill to coordinate analysis of its natural gas. However, it is necessary for the Mill to average HHV data received from its suppliers, or replace missing data in accordance with 40 CFR Part 98 requirements.

As specified in §98.33, if the results of fuel sampling and analysis are received less frequently than monthly, then the annual average HHV for that fuel will be calculated as either the arithmetic average HHV for all values for the year (including valid samples and substitute data values under §98.35) or as a weighted annual average per Equation C-2b of Subpart C. If the results of fuel sampling are received monthly or more frequently, then the Mill must use Equation C-2b to determine a weighted annual average HHV of natural gas.

For each fuel-specific HHV that is missing, an arithmetic average will be used as a replacement value. The arithmetic average will be calculated using the quality-assured HHV value immediately preceding and immediately following the missing data incident. If a quality-assured "after" value has not been obtained by the time the GHG emissions report is due, then the quality-assured "before" value for missing data substitution or the best available estimate of the parameter, based on all available process data (e.g., electrical load, steam production, operating hours), will be used. If no quality-assured "before" value is available prior to the missing data incident, then the substitute data value will be the first quality-assured value obtained after the missing data period.

Missing Fuel Usage Data (Subpart C)

The Mill utilizes fuel usage data for natural gas, biogas, and propane to calculate emissions under the Tiers 1 and 2 calculation methodologies. For missing natural gas, biogas, or propane fuel usage data, the Mill will substitute missing data with the best available estimate of fuel usage based on all available process data. The Mill will document and retain records of the procedures used for all such estimates.

3.8.2 Missing Data for Pulp and Paper Manufacturing (Subpart AA)

In addition to the parameters of fuel usage and HHV required under Subpart C, for those emissions units regulated under 40 CFR Part 98, Subpart AA, the Filer City Mill uses black liquor analyses and carbonate make-up chemical purchase records to determine process-related GHG emissions. The potential for missing data to affect the GHG emission calculations from emissions units at sources regulated under Subpart AA is relatively low. Therefore, the Mill has developed limited missing data procedures relative to Subpart AA emissions units.

Missing Copeland Reactor Data (Subpart AA)

The Mill will follow the missing data procedures outlined in Subpart C for parameters related to the firing of fossil-fuel in the Copeland Reactor with thermal oxidizer control, and will follow the missing data procedures outlined in Subpart AA for parameters used to calculate biogenic emissions due to the firing of spent liquor solids.

The Mill utilizes an online measurement system to measure the flow of spent liquor solids fired in the Copeland Reactor with thermal oxidizer control. If a value related to the amount of spent liquor solids fired is missing, then the Mill will substitute the lesser value of either the maximum mass or flow rate of the Copeland Reactor with thermal oxidizer control, or the maximum mass or flow rate that the measurement system can measure.

The Mill recognizes that 40 CFR Part 98 does not include missing data provisions for spent liquor solids HHV or CC sampling data and therefore, ensures, that at least one analysis of black liquor HHV and CC is performed annually. Additional analyses will be performed at the discretion of the Mill.

Missing Chemical Make-up Data (Subpart AA)

The Mill uses purchase records to determine the mass of carbonate make-up chemicals that are added to the Mill's pulping process. The possibility of an occurrence involving a missing purchase record involving carbonate is extremely low since the Mill does not routinely purchase carbonate make-up chemicals and back-up purchasing records are maintained by the Mill and the Mill's vendors. Thus, there are no missing data procedures for carbonate make-up chemical data.

3.8.3 Missing Data for Industrial Wastewater Treatment (Subpart II)

The Filer City Mill monitors and records the following parameters in accordance with Subpart II:

- Cumulative weekly volume of whitewater sent to Biogas Reactors.
- Weekly average concentration of whitewater Chemical Oxygen Demand (COD) entering Biogas Reactors.
- Cumulative weekly volumetric flow of biogas recovered.

- Weekly average CH_4 concentration of biogas.

Missing Whitewater Flow Data (Subpart II)

Pursuant to 40 CFR §98.355(a), for each missing weekly measurement of whitewater flow to the Biogas Reactors' wastewater treatment process, the substitute data value must be the arithmetic average of the quality-assured values of those parameters for the week immediately preceding and the week immediately following the missing data incident.

The Mill utilizes an online measurement system to measure the flow of whitewater to the Biogas Reactors. If a value related to the whitewater flow is missing, then the Mill will calculate the arithmetic average of the quality-assured values of that parameter for the week immediately preceding and the week immediately following the missing data incident.

Missing Chemical Oxygen Demand Data (Subpart II)

Pursuant to 40 CFR §98.355(a), for each missing weekly average concentration of whitewater COD entering the Biogas Reactors' wastewater treatment process, the substitute data value must be the arithmetic average of the quality-assured values of those parameters for the week immediately preceding and the week immediately following the missing data incident.

The Mill measures COD using Method 5220D, an accepted method cited in Table 1B of 40 CFR §136.3 (40 CFR §98.354(b). If a weekly average value related to the whitewater COD is missing, then the Mill will calculate the arithmetic average of the quality-assured values of that parameter for the week immediately preceding and the week immediately following the missing data incident.

Missing Biogas Flow Data (Subpart II)

Pursuant to 40 CFR §98.355(b), for each missing weekly measurement of biogas recovered by the reactors, the substitute data value must be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident.

The Mill utilizes an online measurement system to measure the flow of biogas that is recovered by the reactors. The online measurement system consists of a calibrated multivariable flow meter installed immediately after the reactors and bypass to the flare, but prior to the powerhouse. If a weekly value related to the biogas flow is missing, then the Mill will calculate the arithmetic average of the quality-assured values of that parameter for the week immediately preceding and the week immediately following the missing data incident.

Missing Biogas Methane Concentration Data (Subpart II)

Pursuant to 40 CFR §98.355(b), for each missing weekly average value of biogas CH_4 content, the substitute data value must be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident.

The Mill utilizes an online measurement system to measure the CH_4 concentration of the generated biogas. If a weekly average value of the biogas CH_4 concentration is missing, then the Mill will calculate the arithmetic average of the quality-assured values of that parameter for the week immediately preceding and the week immediately following the missing data incident.

3.9 INFORMATION TO BE REPORTED ANNUALLY

The Filer City Mill will electronically submit an annual GHG Summary Report to U.S. EPA via the Electronic Greenhouse Gas Reporting Tool (e-GGRT) database no later than March 31st (or as prescribed by U.S. EPA) of each calendar year for GHG emissions associated with each previous calendar year. The information that is to be included in each annual GHG Summary Report, and the provisions for allowing use of alternative verification software in lieu of reporting certain unit-specific information, is specified at 40 CFR §98.3(c), §98.36, §98.276, and §98.356 for Subparts A, C, AA, and II, respectively. For informational purposes, the types of data U.S. EPA requires to be reported for each of the three subparts are summarized in Table 3-21 through Table 3-29. These tables are provided for informational purposes only. As stated above, the Mill electronically submits each annual GHG Summary Report via U.S. EPA's e-GGRT database, and the e-GGRT database requires manual entry of each type of data specified at 40 CFR §98.3(c), §98.36, §98.276, and §98.356.

Table 3-1
Summary of Aggregated Source Groups
Packaging Corporation of America - Filer City, MI Mill

Group ID	Unit Descriptions	Maximum Rated Heat Capacity (MMBtu/hr)	Fuel Type	Fuel Meters	CO_2 Calculation Tier
GP-001	Boiler No. 1	240 MMBtu/hr	Natural Gas	Michicon Gas Meters Nos. 9651999 and 9600227 Michicon Gas Meter No. 3 Michicon Gas Meter No. 4 Michicon Gas Meter No. 6740893 West Bay Gas Meter No. 00-0800218 West Bay Gas Meter No. 00-0600221	Tier 2
	Boiler No. 2	186 MMBtu/hr			
	Boiler No. 4A	227 MMBtu/hr			
GP-002	Boiler No. 2	186 MMBtu/hr	Biogas	Mill-Owned Boiler No. 2 Biogas Meter	Tier 1
	Boiler No. 4A	227 MMBtu/hr		Mill-Owned Boiler No. 4A Biogas Meter	
	Biogas Flare	97 MMBtu/hr		Mill-Owned Biogas Flare Temperature Monitor	

[(a)] The Mill independently calculates and reports GHG emissions resulting from firing other fuels in the combustion sources.

[(b)] The natural gas companies supply HHV data to the Mill on a semi-annual basis, with at least four months between each analysis.

GHG Sample Calculations

GP-001 Natural Gas Fuel Throughput	Annual Volume of Natural Gas Fired in GP-001 (scf) = [Natural Gas Fired by Boiler No. 1 (Michicon Gas Meters Nos. 9651999 and 9600227)] + [Natural Gas Fired By Boiler No. 1 (West Bay Gas Meter No. 00-0800218)] + [Natural Gas Fired by Boiler No. 2 (Michicon Gas Meter No. 3 and 4] + [Natural Gas Fired by Boiler No. 4A (Michicon Gas Meter No. 6740893)] + [Natural Gas Fired by Boilers No. 2 and No. 4A (Shared West Bay Gas Meter No. 00-0600221)]
GP-002 Biogas Fuel Throughput	Annual Volume of Biogas Fired in GP-002 (scf) = [Biogas Fired by Boiler No. 2 (Mill-owned Biogas Meter) + Biogas Fired by Boiler No. 4A (Mill-owned Biogas Meter) + Biogas Fired by Biogas Flare (Temperature Monitor)]

Table 3-2
GP-001 Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Max Rated Heat Input: 240 MMBtu/hr
Common Pipe Approach: No
Aggregation Approach: Yes
Common Stack Approach: No
CO_2 CEM Operating: No
Biogenic Emissions: No
Sorbent Used: No

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Carbon Content	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Natural Gas	cubic feet	Semi-Annually [a]	N/A	No	2	C-2a, C-2b	C-9a

[a] The Mill obtains HHV data from the natural gas suppliers.

GHG Sample Calculations

Equation	Sample Calculation
C-2a	GP-001 CO_2 (metric tons) = $(1x10^{-03})$ x (annual volume of natural gas fired in Boiler No. 1, Boiler No. 2, and Boiler No. 4a) x (HHV per Eq. C-2b) x (Table C-1 Emission Factor)
C-2b	$HHV_{(annual)} = \frac{\sum_{i=1}^{n}((HHV)_i \times (Fuel)_i)}{\sum_{i=1}^{n}(Fuel)_i}$ Where: $(HHV)_{annual}$ = Weighted annual average HHV of the fuel (MMBtu per volume) $(HHV)_i$ = Measured high heat value of the fuel, for sample period "i" (which may be arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (MMBtu per volume) $(Fuel)_i$ = Volume of the fuel combusted during the sample period "i" (i.e., semi-annually) from company records (in standard cubic feet) n = Number of sample periods in year
C-9a	GP-001 CH_4 (metric tons) = $(1x10^{-03})$ x (annual volume of natural gas fired in Boiler No. 1, Boiler No. 2, and Boiler No. 4a) x (HHV per Eq. C-2b) x (Table C-2 Emission Factor) GP-001 N_2O (metric tons) = $(1x10^{-03})$ x (annual volume of natural gas fired in Boiler No. 1, Boiler No. 2, and Boiler No. 4a) x (HHV per Eq. C-2b) x (Table C-2 Emission Factor)

Table 3-3
GP-002 Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Max Rated Heat Input:	227 MMBtu/hr	**Aggregation Approach:**	Yes	**CO_2 CEM Operating:**	No	**Sorbent Used:**	No
Common Pipe Approach:	No	**Common Stack Approach:**	No	**Biogenic Emissions:**	Yes		

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Carbon Content	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Biogas	cubic feet	N/A	N/A	Yes	1	C-1	C-8

GHG Sample Calculations

Equation	Sample Calculation
C-1	GP-002 CO_2 (metric tons) = ($1x10^{-03}$) x (annual volume of biogas fired in Boiler No. 2, Boiler No. 4a, and Biogas Flare) x (HHV per Table C-1) x (Table C-1 Emission Factor)
C-8	GP-002 CH_4 (metric tons) = ($1x10^{-03}$) x (annual volume of biogas fired in Boiler No. 2, Boiler No. 4a, and Biogas Flare) x (HHV per Table C-1) x (Table C-2 Emission Factor)
	GP-002 N_2O (metric tons) = ($1x10^{-03}$) x (annual volume of biogas fired in Boiler No. 2, Boiler No. 4a, and Biogas Flare) x (HHV per Table C-1) x (Table C-2 Emission Factor)

Table 3-4
EUBOILER1 Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Heat Input: 240 MMBtu/hr
Aggregation Approach: Yes (Natural Gas)
CO_2 CEM Operating: No
Sorbent Used: No
Common Pipe Approach: No
Common Stack Approach: No
Biogenic Emissions: No

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Carbon Content	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Natural Gas	cubic feet	Semi-Annually[a]	N/A	No	2	C-2a, C-2b	C-9a

[a] The Mill obtains natural gas HHV data from the suppliers.

[b] Emissions due to firing natural gas in EUBOILER1 are calculated and accounted for under group GP-001 using the aggregated emissions unit approach detailed in Tables 3-1 and 3-2.

GHG Sample Calculations

Equation	Sample Calculation
C-2a	Refer to Table 3-2.
C-2b	Refer to Table 3-2.
C-9a	Refer to Table 3-2.
	Refer to Table 3-2.

Table 3-5
EUBOILER2 Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Heat Input: 186 MMBtu/hr **Aggregation Approach:** Yes (Natural Gas, Biogas) **CO_2 CEM Operating:** No **Sorbent Used:** No
Common Pipe Approach: No **Common Stack Approach:** No **Biogenic Emissions:** Yes (Biogas)

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Carbon Content	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Natural Gas	cubic feet	Semi-Annually [a]	N/A	No	2	C-2a, C-2b	C-9a
Biogas	cubic feet	N/A	N/A	Yes	1	C-1	C-8

[a] The Mill obtains natural gas HHV data from the suppliers.

[b] Emissions due to firing natural gas and biogas in EUBOILER2 are calculated and accounted for under groups GP-001 and GP-002, respectively, using the aggregated emissions unit approach detailed in Tables 3-1 through 3-3.

GHG Sample Calculations

Equation	Sample Calculation
C-2a	Refer to Table 3-3.
C-2b	Refer to Table 3-3.
C-9a	Refer to Table 3-3.
	Refer to Table 3-3.

Table 3-6
EUBOILER4A Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Heat Input: 227 MMBtu/hr
Aggregation Approach: Yes (Natural Gas, Biogas)
CO_2 CEM Operating: No
Sorbent Used: No
Common Pipe Approach: No
Common Stack Approach: No
Biogenic Emissions: Yes (Biogas)

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Carbon Content	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Natural Gas	cubic feet	Semi-Annually [a]	N/A	No	2	C-2a, C-2b	C-9a
Biogas	cubic feet	N/A	N/A	Yes	1	C-1	C-8

[a] The Mill obtains natural gas HHV data from the suppliers.

[b] Emissions due to firing natural gas and biogas in EUBOILER4A are calculated and accounted for under groups GP-001 and GP-002, respectively, using the aggregated emissions unit approach detailed in Tables 3-1 through 3-3.

GHG Sample Calculations

Equation	Sample Calculation
C-1	Refer to Table 3-3.
C-2a	Refer to Table 3-2.
C-2b	Refer to Table 3-2.
C-8	Refer to Table 3-3.
C-9a	Refer to Table 3-2.

Table 3-7
EUBIOGASFLARE Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Heat Input: 97 MMBtu/hr **Aggregation Approach:** Yes (Biogas) **CO_2 CEM Operating:** No **Sorbent Used:** No
Common Pipe Approach: No **Common Stack Approach:** No **Biogenic Emissions:** Yes (Biogas)

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Carbon Content	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Biogas	cubic feet	N/A	N/A	Yes	1	C-1	C-8

[a] Emissions due to firing biogas in EUBIOGASFLARE are calculated and accounted for under group GP-002 using the aggregated emissions unit approach detailed in Tables 3-1 and 3-3.

GHG Sample Calculations

Equation	Sample Calculation
C-1	Refer to Table 3-3 (biogas).
C-8	Refer to Table 3-3 (biogas).

Table 3-8
WWTP Building GHG Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Heat Input: 1.2 MMBtu/hr
Common Pipe Approach: No
Aggregation Approach: No
Common Stack Approach: No
CO_2 CEM Operating: No
Biogenic Emissions: No
Sorbent Used: No

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Carbon Content	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Propane	gallons	N/A	N/A	No	1	C-1	C-8

GHG Sample Calculations

Equation	Sample Calculation
C-1	WWTP Building CO_2 (metric tons) = ($1x10^{-03}$) x (annual volume of propane fired from purchase records) x (Table C-1 default HHV) x (Table C-1 Emission Factor)
C-8	WWTP Building CH_4 (metric tons) = ($1x10^{-03}$) x (annual volume of propane fired from purchase records) x (Table C-1 default HHV) x (Table C-2 Emission Factor)
	WWTP Building N_2O (metric tons) = ($1x10^{-03}$) x (annual volume of propane fired from purchase records) x (Table C-1 default HHV) x (Table C-2 Emission Factor)

Table 3-9

EUCOPELAND GHG Calculation Approach and Sample Calculations

Packaging Corporation of America - Filer City, MI Mill

Heat Input: 178.3 MMMBtu/hr **Biogenic Emissions:** Yes **Sorbent Used:** No

Spent Liquor Solids Firing Rate: 50,000 lbs/hr **Spent Liquor Solids Type:** Hardwood

GHG Calculation Approach

Fuel	Usage Units	Frequency of HHV Analysis	Frequency of Carbon Content Analysis	Biogenic	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Spent Liquor Solids	short tons	Annually[(a)]	Annually[(a)]	Yes	N/A	AA-2	AA-1
Natural Gas	cubic feet	Semi-Annually[(b)]	N/A	No	2	C-2a, C-2b	C-9a

[(a)] The Mill is responsible for coordinating sampling and analysis of spent liquor solids HHV and carbon content at least once per year.

[(b)] The Mill obtains natural gas HHV data from the natural gas supplier.

GHG Sample Calculations

Equation	Sample Calculation
AA-1	EUCOPELAND CH_4, or $N_2O_{(hardwood\ spent\ liquor\ solids)}$ (metric tons) = (0.90718) x (mass of spent liquor solids combusted) x (measured hardwood spent liquor solids HHV) x (Table AA-1 Hardwood Emission Factor)
AA-2	EUCOPELAND $CO_{2(hardwood\ spent\ liquor\ solids)}$ (metric tons) = (44/12) * (mass of spent liquor solids combusted) x (carbon content of spent liquor solids) x (0.90718)
C-2a	EUCOPELAND $CO_{2(natural\ gas)}$ (metric tons) = ($1x10^{-03}$) x (annual volume of natural gas fired) x (HHV per Eq. C-2b) x (Table C-1 Emission Factor)
C-2b	$HHV_{(annual)} = \frac{\sum_{i=1}^{n}\left((HHV)_i \times (Fuel)_i\right)}{\sum_{i=1}^{n}(Fuel)_i}$ Where: $(HHV)_{annual}$ = Weighted annual average HHV of the fuel (MMBtu per volume) $(HHV)_i$ = Measured high heat value of the fuel, for sample period "i" (which may be arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (MMBtu per volume) $(Fuel)_i$ = Volume of the fuel combusted during the sample period "i" (i.e., semi-annually) from company records (in standard cubic feet) n = Number of sample periods in year
C-9a	EUCOPELAND $CH_{4(natural\ gas)}$ (metric tons) = ($1x10^{-03}$) x (annual volume of natural gas fired) x (HHV per Eq. C-2b) x (Table C-2 Emission Factor) EUCOPELAND $N_2O_{(natural\ gas)}$ (metric tons) = ($1x10^{-03}$) x (annual volume of natural gas fired) x (HHV per Eq. C-2b) x (Table C-2 Emission Factor)

Table 3-10
Carbonate Purchase Make-Up Chemical GHG Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

Heat Input:	N/A	**Aggregation Approach:**	N/A	**CEM Operating:**	N/A
Common Pipe Approach:	N/A	**Common Stack Approach:**	N/A	**Biogenic Emissions:**	N/A

GHG Calculation Approach

Type of Carbonate Make-Up Chemical Purchased	Usage Units	CO_2 Calculation Tier	CO_2 Calculation Equation	CH_4/N_2O Calculation Equation
Sodium Carbonate (Na_2CO_3)	Metric tons	N/A	AA-3	N/A

GHG Sample Calculations

Equation	Sample Calculation
AA-3	CO_2 (metric tons) = (Mass of Sodium Carbonate x 44/105.99) x 1000

Table 3-11
Biogas Reactors GHG Calculation Approach and Sample Calculations
Packaging Corporation of America - Filer City, MI Mill

GHG Sample Calculations

Equation	Sample Calculation
II-1	$CH_4G_n = \sum_{w=1}^{52}\left[Flow_w * COD_w * B_o * MCF * 0.001\right]$ Where: CH_4G_n = Annual mass CH_4 generated from the nth anaerobic wastewater treatment process (metric tons). n = Index for processes at the facility, used in Equation II-7. w = Index for weekly measurement period. $Flow_w$ = Volume of wastewater sent to an anaerobic wastewater treatment process in week w (m^3/week), measured as specified in §98.354(d). COD_w = Average weekly concentration of chemical oxygen demand of wastewater entering an anaerobic wastewater treatment process (for week w)(kg/m^3), measured as specified in §98.354(b) and (c). B_0 = Maximum CH_4 producing potential of wastewater (kg CH_4/kg COD), use the value 0.25. MCF = CH_4 conversion factor, based on relevant values in Table II-1 of this subpart. 0.001 = Conversion factor from kg to metric tons.
II-4	$R_n = \sum_{m=1}^{M}\left[(V)_m * (K_{MC})_m * \frac{(C_{CH4})_m}{100\%} * 0.0423 * \frac{520°R}{(T)_m} * \frac{(P)_m}{1\ atm} * \frac{0.454}{1,000}\right]$ Where: Rn = Annual quantity of CH_4 recovered from the nth anaerobic reactor, sludge digester, or lagoon (metric tons CH_4/yr) n = Index for processes at the facility, used in Equation II-7. M = Total number of measurement periods in a year. Use M = 365 (M = 366 for leap years) for daily averaging of continuous monitoring, as provided in paragraph (c)(1)of this section. Use M = 52 for weekly sampling, as provided in paragraph (c)(2)of this section. m = Index for measurement period. Vm = Cumulative volumetric flow for the measurement period in actual cubic feet (acf). If no biogas was recovered during a monitoring period, use zero. (KMC)m = Moisture correction term for the measurement period, volumetric basis. = 1 when (V)m and (CCH4)m are measured on a dry basis or if both are measured on a wet basis. = 1−(fH2O)m when (V)m is measured on a wet basis and (CCH4)m is measured on a dry basis. = 1/[1−(fH2O)m] when (V)m is measured on a dry basis and (CCH4)m is measured on a wet basis. (fH2O)m = Average moisture content of biogas during the measurement period, volumetric basis, (cubic feet water per cubic feet biogas). (CCH4)m = Average CH_4 concentration of biogas during the measurement period, (volume %). 0.0423 = Density of CH_4 lb/cf at 520 °R or 60 °F and 1 atm.
II-5	$CH_4L_n = R_n * \left(\frac{1}{CE} - 1\right)$ (Eq. II-5) Wnere: CH_4L_n = Leakage at the anaerobic process n (metric tons CH_4). n = Index for processes at the facility, used in Equation II-7. R_n = Annual quantity of CH_4 recovered from the nth anaerobic reactor, anaerobic lagoon, or anaerobic sludge digester, as calculated in Equation II-4 of this section (metric tons CH_4). CE = CH_4 collection efficiency of anaerobic process n, as specified in Table II-2 of this subpart (decimal).
II-6	$CH_4E_n = CH_4L_n + R_n\ (1- [\ (D_{E1} * f_{Dest\_1}\ ) + (DE_2 * f_{Dest\_2})])$ (Eq. II-6) Where: CH_4E_n = Annual quantity of CH_4 emitted from the process n from which biogas is recovered (metric tons). n = Index for processes at the facility, used in Equation II-7. CH_4L_n = Leakage at the anaerobic process n, as calculated in Equation II-5 of this section (metric tons CH_4). R_n = Annual quantity of CH_4 recovered from the nth anaerobic reactor or anaerobic sludge digester, as calculated in Equation II-4 of this section (metric tons CH_4). DE_1 = Primary destruction device CH_4 destruction efficiency (lesser of manufacturer's specified destruction efficiency and 0.99). If the biogas is transported off-site for destruction, use DE = 1. fDest_1 = Fraction of hours the primary destruction device was operating calculated as the annual hours when the destruction device was operating divided by the annual operating hours of the biogas recovery system. If the biogas is transported off-site for destruction, use f_{Dest} = 1. DE_2 = Back-up destruction device CH_4 destruction efficiency (lesser of manufacturer's specified destruction efficiency and 0.99). fDest_2 = Fraction of hours the back-up destruction device was operating calculated as the annual hours when the destruction device was operating divided by the annual operating hours of the biogas recovery system.

[a] Per §98.358, "weekly average" means the sum of all values measured in a calendar week divided by the number of measurements.

Table 3-12
Exempt Emissions Unit Criteria
Packaging Corporation of America - Filer City, MI Mill

Exempt Equipment Type	Criteria	Exempt Emissions Units
Portable Equipment	Designated and capable of being carried or moved from one location to another. Indications of portability include but are not limited to wheels, skids, carrying handles, dolly, trailer, or platform. Equipment is not portable if any one of the following conditions exists: (1) The equipment is attached to a foundation. (2) The equipment or a replacement resides at the same location for more than 12 consecutive months. (3) The equipment is located at a seasonal facility and operates during the full annual operating period of the seasonal facility, remains at the facility for at least two years, and operates at that facility for at least three months each year. (4) The equipment is moved from one location to another in an attempt to circumvent the portable residence time requirements of this definition.	Yes
Emergency Generators	A stationary combustion device, such as a reciprocating internal combustion engine or turbine that serves solely as a secondary source of mechanical or electrical power whenever the primary energy supply is disrupted or discontinued during power outages or natural disasters that are beyond the control of the owner or operator of the facility. An emergency generator operates only during emergency situations, for training of personnel under simulated emergency conditions, as part of emergency demand response procedures, or for standard performance testing procedures as required by law or by the generator manufacturer. A generator that serves as a back-up power source under conditions of load shedding, peak shaving, power interruptions pursuant to an interruptible power service agreement, or scheduled facility maintenance shall not be considered an emergency generator.	Yes
Emergency Equipment	Any auxiliary fossil fuel-powered equipment, such as a fire pump, that is used only in emergency situations.	Yes

Table 3-13
Verification of Reporting Requirements – GP-001

<u>GP-001</u> **CALCULATION METHODOLOGY REPORTING REQUIREMENTS**					
Total Quantity of ***Natural Gas*** Combusted per month in ***GP-001*** (scf)					
January		May		September	
February		June		October	
March		July		November	
April		August		December	

Number and Frequency of Required Higher Heating Value (HHV) Determinations per Reporting Period	***Two***	***Semi-Annually***

Fuel HHV (as used in Equation C-2a and C-9a)				
Month	HHV	Units	Measured or Substituted Data	Test Method (§98.7)
January		MMBtu/scf	Measured ☐ Substituted ☐	
February		MMBtu/scf	Measured ☐ Substituted ☐	
March		MMBtu/scf	Measured ☐ Substituted ☐	
April		MMBtu/scf	Measured ☐ Substituted ☐	
May		MMBtu/scf	Measured ☐ Substituted ☐	
June		MMBtu/scf	Measured ☐ Substituted ☐	
July		MMBtu/scf	Measured ☐ Substituted ☐	
August		MMBtu/scf	Measured ☐ Substituted ☐	
September		MMBtu/scf	Measured ☐ Substituted ☐	
October		MMBtu/scf	Measured ☐ Substituted ☐	
November		MMBtu/scf	Measured ☐ Substituted ☐	
December		MMBtu/scf	Measured ☐ Substituted ☐	

Table 3-14
Verification of Reporting Requirements – GP-002

<table>
<tr><th colspan="6"><u>GP-002</u> CALCULATION METHODOLOGY REPORTING REQUIREMENTS</th></tr>
<tr><td colspan="6">Total Quantity of Biogas Combusted per month in GP-002 (scf)</td></tr>
<tr><td>January</td><td></td><td>May</td><td></td><td>September</td><td></td></tr>
<tr><td>February</td><td></td><td>June</td><td></td><td>October</td><td></td></tr>
<tr><td>March</td><td></td><td>July</td><td></td><td>November</td><td></td></tr>
<tr><td>April</td><td></td><td>August</td><td></td><td>December</td><td></td></tr>
<tr><td colspan="3">Number and Frequency of Required Higher Heating Value (HHV) Determinations per Reporting Period</td><td colspan="2">N/A</td><td>N/A</td></tr>
</table>

Table 3-15
Verification of Reporting Requirements – WWTP Building

<u>WWTP Building</u> CO_2 CALCULATION METHODOLOGY REPORTING REQUIREMENTS					
Total Quantity of ***Propane*** Combusted per month in ***WWTP Building*** (gallons)					
January		May		September	
February		June		October	
March		July		November	
April		August		December	

Number and Frequency of Required Higher Heating Value (HHV) Determinations per Reporting Period	***N/A***	***N/A***
Fuel HHV (as listed in Table C-1) ***0.091 MMBtu/gallon***		

Table 3-16
Verification of Reporting Requirements – EUCOPELAND

<u>EUCOPELAND</u> CO_2 CALCULATION METHODOLOGY REPORTING REQUIREMENTS					
Total Quantity of ***BLS*** Combusted per month in ***EUCOPELAND*** (short tons)					
January		May		September	
February		June		October	
March		July		November	
April		August		December	

Number and Frequency of Required Higher Heating Value (HHV) Determinations per Reporting Period	***One***	***Annually***

Fuel HHV (as used in Equation AA-1)				
Month	HHV	Units	Measured or Substituted Data	Test Method (§98.7)
January		MMBtu/short ton	Measured ☐ Substituted ☐	
February		MMBtu/short ton	Measured ☐ Substituted ☐	
March		MMBtu/short ton	Measured ☐ Substituted ☐	
April		MMBtu/short ton	Measured ☐ Substituted ☐	
May		MMBtu/short ton	Measured ☐ Substituted ☐	
June		MMBtu/short ton	Measured ☐ Substituted ☐	
July		MMBtu/short ton	Measured ☐ Substituted ☐	
August		MMBtu/short ton	Measured ☐ Substituted ☐	
September		MMBtu/short ton	Measured ☐ Substituted ☐	
October		MMBtu/short ton	Measured ☐ Substituted ☐	
November		MMBtu/short ton	Measured ☐ Substituted ☐	
December		MMBtu/short ton	Measured ☐ Substituted ☐	

Table 3-16
Verification of Reporting Requirements – EUCOPELAND, continued

EUCOPELAND CO_2 CALCULATION METHODOLOGY REPORTING REQUIREMENTS				
Number and Frequency of Required Carbon Content (CC) Determinations per Reporting Period			***One***	***Annually***
Spent Liquor Solids CC (as used in Equation AA-2)				
Month	CC	Units	Measured or Substituted Data	Test Method (§98.7)
January		Decimal fraction	Measured ☐ Substituted ☐	
February		Decimal fraction	Measured ☐ Substituted ☐	
March		Decimal fraction	Measured ☐ Substituted ☐	
April		Decimal fraction	Measured ☐ Substituted ☐	
May		Decimal fraction	Measured ☐ Substituted ☐	
June		Decimal fraction	Measured ☐ Substituted ☐	
July		Decimal fraction	Measured ☐ Substituted ☐	
August		Decimal fraction	Measured ☐ Substituted ☐	
September		Decimal fraction	Measured ☐ Substituted ☐	
October		Decimal fraction	Measured ☐ Substituted ☐	
November		Decimal fraction	Measured ☐ Substituted ☐	
December		Decimal fraction	Measured ☐ Substituted ☐	

Table 3-16
Verification of Reporting Requirements – EUCOPELAND, continued

Total Quantity of ***Natural Gas*** Combusted per month in ***EUCOPELAND*** (scf)					
January		May		September	
February		June		October	
March		July		November	
April		August		December	

Number and Frequency of Required Higher Heating Value (HHV) Determinations per Reporting Period	***Two***	***Semi-Annually***

Fuel HHV (as used in Equation AA-1)				
Month	HHV	Units	Measured or Substituted Data	Test Method (§98.7)
January		MMBtu/scf	Measured ☐ Substituted ☐	
February		MMBtu/scf ton	Measured ☐ Substituted ☐	
March		MMBtu/scf	Measured ☐ Substituted ☐	
April		MMBtu/scf	Measured ☐ Substituted ☐	
May		MMBtu/scf	Measured ☐ Substituted ☐	
June		MMBtu/scf	Measured ☐ Substituted ☐	
July		MMBtu/scf	Measured ☐ Substituted ☐	
August		MMBtu/scf	Measured ☐ Substituted ☐	
September		MMBtu/scf	Measured ☐ Substituted ☐	
October		MMBtu/scf	Measured ☐ Substituted ☐	
November		MMBtu/scf	Measured ☐ Substituted ☐	
December		MMBtu/scf	Measured ☐ Substituted ☐	

Table 3-17
Verification of Reporting Requirements – Other Subpart AA Requirements

OTHER RECORDKEEPING REQUIREMENTS					
Total Quantity of ***Steam Purchased (pounds):***					
January		May		September	
February		June		October	
March		July		November	
April		August		December	
Total Quantity of ***(Virgin Only) Pulp Products Produced (metric tons):***					
January		May		September	
February		June		October	
March		July		November	
April		August		December	
Total Quantity of ***(Virgin and Recycle) Paper Products Produced (metric tons):***					
January		May		September	
February		June		October	
March		July		November	
April		August		December	
Total Make-Up Quantity of ***Sodium Carbonate*** Used ***(metric tons):***					
January		May		September	
February		June		October	
March		July		November	
April		August		December	

Table 3-18
Verification of Reporting Requirements – Biogas Reactors

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
51							
52							

Table 3-19
General Annual Reporting Requirements

I. COMPANY IDENTIFYING INFORMATION		
Company Name:		
Federal Registry System Identification Number:		
Date of Submittal:		
Reporting Year and Months:		
II. FACILITY INFORMATION		
Facility Name:		
Mailing Address:		
City:	State:	Zip:
Physical Address:		
City:	State:	Zip:
III. DESIGNATED REPRESENTATIVE (DR) OR ALTERNATIVE DESIGNATED REPRESENTATIVE (ADR) OR DELEGATED AGENT (DA) IDENTIFYING INFORMATION		
DR/ADR/DA Name: ☐ Mr. ☐ Mrs. ☐ Ms.☐ Dr.		
DR/ADR/DA Title:		
Employer Name:		
Mailing Address:		
City:	State:	Zip Code:
Telephone:	Fax:	E-mail:
IV. CERTIFICATION OF TRUTH		

I, ____, certify that I am authorized to make this submission on behalf of the owners and operators of the facility (or supply operation, as appropriate) for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Signature: ______________________________ Signature Date: _________________________

Title: ____

V. TOTAL FACILITY GHG EMISSIONS	
Total Biogenic Carbon Dioxide	MT CO_2
Total Non-Biogenic Carbon Dioxide	MT CO_2
Total Methane	MT CH_4
Total Nitrogen Oxide	MT N_2O

Table 3-20
Subpart C Data Reporting Requirements – GP-001

UNIT-LEVEL EMISSIONS DATA REPORTING		
Unit Name:	***GP-001***	
Unit Type:	***Other Combustion Source***	
Unit Description:	***Boiler No. 1, Boiler No. 2, Boiler No. 4A***	
Highest Maximum Rated Heat Input Capacity:	***240***	MMBtu/hr
Type(s) of Fuel Combusted:	***Natural Gas***	
§98.36(c) Reporting Alternatives Utilized:	***Aggregation of Units***	
Emissions from ***<u>Natural Gas</u>*** Combustion:		MT Total CO_2
	N/A	MT Biogenic Only CO_2
		MT CH_4
		MT N_2O
		MT CH_4 CO_2e
		MT N_2O CO_2e
CO_2 Calculation Tier:	***Natural Gas***	***Tier 2***

Table 3-21
Subpart C Data Reporting Requirements – GP-002

UNIT-LEVEL EMISSIONS DATA REPORTING		
Unit Name:	***GP-002***	
Unit Type:	***Other Combustion Source***	
Unit Description:	***Boiler No. 2, Boiler No. 4A, Biogas Flare***	
Highest Maximum Rated Heat Input Capacity:	***227***	MMBtu/hr
Type(s) of Fuel Combusted:	***Biogas***	
§98.36(c) Reporting Alternatives Utilized:	***Aggregation of Units***	
Emissions from ***Biogas*** Combustion:		MT Total CO_2
		MT Biogenic Only CO_2
		MT CH_4
		MT N_2O
		MT CH_4 CO_2e
		MT N_2O CO_2e
CO_2 Calculation Tier:	***Biogas***	***Tier 1***

Table 3-22
Subpart C Data Reporting Requirements – WWTP Building

UNIT-LEVEL EMISSIONS DATA REPORTING		
Unit Name:	***WWTP Building***	
Unit Type:	***Other Boiler***	
Unit Description:	***WWTP Building***	
Maximum Rated Heat Input Capacity:	***1.2***	MMBtu/hr
Type(s) of Fuel Combusted:	***Propane***	
§98.36(c) Reporting Alternatives Utilized:	***None***	
Emissions from ***Propane*** Combustion:		MT Total CO_2
	N/A	MT Biogenic Only CO_2
		MT CH_4
		MT N_2O
		MT CH_4 CO_2e
		MT N_2O CO_2e
CO_2 Calculation Tier:	***Propane***	***Tier 1***

Table 3-23
Subpart AA Data Reporting Requirements – General

GENERAL DATA REPORTING	
Annual Steam Purchase Quantity:	***Pounds***
Annual (Virgin Only) Pulp Products Produced:	***Metric Tons***
Annual (Virgin and Recycle) Paper Products Produced:	***Metric Tons***

Table 3-24
Subpart AA Data Reporting Requirements – EUCOPELAND

UNIT-LEVEL EMISSIONS DATA REPORTING		
Unit Name:	***Source ID EUCOPELAND***	
Unit Type:	***Chemical Recovery Combustion Unit***	
Unit Description:	***Copeland Reactor with Thermal Oxidizer Control***	
Type(s) of Fuel Combusted:	***Spent Liquor Solids, Natural Gas***	
Emissions from ***<u>Spent Liquor Solids</u>*** Combustion:		MT Total CO_2
		MT Biogenic Only CO_2
		MT CH_4
		MT N_2O
		MT CH_4 CO_2e
		MT N_2O CO_2e
Emissions from ***<u>Natural Gas</u>*** Combustion:		MT Total CO_2
	N/A	MT Biogenic Only CO_2
		MT CH_4
		MT N_2O
		MT CH_4 CO_2e
		MT N_2O CO_2e
CO_2 Calculation Tier:	***Spent Liquor Solids***	***N/A***
	Natural Gas	***Tier 2***

Table 3-25
Subpart AA Data Reporting Requirements – Make-Up Chemical Usage

UNIT-LEVEL EMISSIONS DATA REPORTING		
Unit Name:	***Source ID EUDIGESTERS***	
Unit Type:	***Pulp Digester***	
Unit Description:	***Pulp Digester***	
Sodium Carbonate Make-up Quantity:		
Emissions from ***Make-Up Chemical Usage:***		MT Total CO_2
	N/A	MT Biogenic Only CO_2
	N/A	MT CH_4
	N/A	MT N_2O
	N/A	MT CH_4 CO_2e
	N/A	MT N_2O CO_2e

Table 3-26
Subpart II Data Reporting Requirements – Biogas Reactors

UNIT-LEVEL EMISSIONS DATA REPORTING		
Unit Name:	***Biogas Reactors***	
Unit Type:	***Anaerobic Reactors***	
Unit Description:	***Bioreactors***	
Emissions from ***Biogas Reactors:***	***N/A***	MT Total CO_2
	N/A	MT Biogenic Only CO_2
		MT CH_4
	N/A	MT N_2O
		MT CH_4 CO_2e
	N/A	MT N_2O CO_2e

Table 3-27
Other Subpart II Data Reporting Requirements

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Weekly Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Weekly Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
1							
2							
3							
4							
5							
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10							
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14							
15							

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Weekly Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Weekly Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
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31							
32							
33							

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Weekly Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Weekly Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							

Week	Volume of Whitewater Sent to Biogas Reactor	Weekly Average Concentration of COD of Whitewater Entering Biogas Reactor	Cumulative Weekly Volumetric Flow of Biogas (To Flare - Wet)	Weekly Average CH_4 Concentration of Biogas	Weekly Average Temperature at which Biogas Flow is Measured (To Flare)	Cumulative Weekly Volumetric Flow of Biogas (To Boilers - Dry)	Weekly Average Pressure at which Biogas Flow is Measured
	(m^3/week)	(kg/m^3)	(scf)	(volume %)	(deg F)	(scf)	(atm)
52							

4. QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

This section of the GHG Monitoring Plan describes the specific QA/QC procedures that are part of the Filer City Mill's effort to measure, record, and report GHG emissions. Where applicable, the Mill references existing QA/QC procedures and documents that have been developed for other regulatory programs at the Mill.

4.1 QA/QC OF GHG MEASUREMENT PROCESSES

The first step in the QA/QC process is to ensure that the measurement process incorporates approved procedures. The following is a discussion of how the Mill quality assures measurements of fuel or process-related material usages.

The initial and ongoing calibration requirements of 40 CFR Part 98 do not apply to emission sources for which Part 98 allows the use of "company records" to quantify fuel usage or other parameters. Each of the facility's stationary fuel combustion sources are permitted to use company records for determining fuel usage; therefore, the stationary fuel combustion sources at the Filer City Mill are not subject to the initial and ongoing calibration requirements of 40 CFR Part 98. For these sources, U.S. EPA instead requires that a description of the procedures and methods used for quality assurance, maintenance and repair of all fuel flow meters, and any other instrumentation used to measure fuel consumption are included in the facility's GHG Monitoring Plan.

The Filer City Mill ensures that Tier 1 and Tier 2 measurements of fuel combusted in its stationary fuel combustion sources are quality-assured by adhering to either the manufacturer's specifications or best acceptable industry practice set forth for each fuel flow meter. Maintenance is performed on each measurement device on an as-needed basis (e.g., when a suspected problem is observed in the collected data). The Mill ensures that measurements of spent liquor solids combusted in the Copeland Reactor are quality-assured by abiding to the monitoring and QA/QC requirements set forth at §98.274(b)(2)(i).

The Filer City Mill ensures that determinations of the GHG properties of the fuels or process-related materials are quality-assured by abiding to the monitoring and QA/QC requirements set forth at §98.34(a) for determining HHV of natural gas and the monitoring and QA/QC requirements set forth at §98.274(b)(1) for determining HHV and CC of spent liquor solids.

A summary of U.S. EPA's recommended procedures that are part of the Mill's GHG measurement process is presented in Tables 4-1 through 4-8 along with the parameters for which each procedure applies.

Table 4-1
QA/QC Procedures for EUBOILER1 GHG Measurements
Packaging Corporation of America - Filer City, Mill MI

Tier	Fuel	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Accepted Methods
2	Michicon Natural Gas (Meters Nos. 9651999 and 9600227)	Fuel Usage	Annual	Direct measurement by fuel flow meter at each source	N/A	Pursuant to §98.3(i)(4), initial and ongoing calibration of fuel billing meters are not required, provided that the fuel supplier and any unit combusting the fuel do not have any common owners and are not owned by subsidiaries or affiliates of the same company.
		HHV	Semi-Annual [a]	The fuel sampling and analysis is performed by the supplier of the fuel.	N/A	Chromatographic analysis together with standard heating values of the fuel constituents, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; or
						A consensus-based standard, if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB). Consensus-based standards include, but are not limited to, the following: ASTM D1826-94 (Reapproved 2003) Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter (incorporated by reference, see §98.7); or ASTM D3588-98 (Reapproved 2003) Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels (incorporated by reference, see §98.7); or ASTM D4891-89 (Reapproved 2006) Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion (incorporated by reference, see §98.7);or
						An industry standard practice. Industry standard practices include, but are not limited to, GPA Standard 2172-09 Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer (incorporated by reference, see §98.7).
2	West Bay Natural Gas (Meter No. 00-0800218)	Fuel Usage	Annual	Direct measurement by fuel flow meter at each source	N/A	Pursuant to §98.3(i)(4), initial and ongoing calibration of fuel billing meters are not required, provided that the fuel supplier and any unit combusting the fuel do not have any common owners and are not owned by subsidiaries or affiliates of the same company.
		HHV	Semi-Annual [a]	The fuel sampling and analysis is performed by the supplier of the fuel.	N/A	Chromatographic analysis together with standard heating values of the fuel constituents, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; or
						A consensus-based standard, if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB). Consensus-based standards include, but are not limed to, the following: ASTM D1826-94 (Reapproved 2003) Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter (incorporated by reference, see §98.7); or ASTM D3588-98 (Reapproved 2003) Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels (incorporated by reference, see §98.7); or ASTM D4891-89 (Reapproved 2006) Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion (incorporated by reference, see §98.7);or
						An industry standard practice. Industry standard practices include, but are not limited to, GPA Standard 2172-09 Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer (incorporated by reference, see §98.7).

[a] If HHV for a specific fuel type is collected at a monthly (or greater) frequency, the Mill must collect monthly fuel usage readings.

[b] Where more than one method is listed for a specific parameter, the Mill shall select one of the listed methods shown in order to perform measurements of that parameter in accordance with the minimum frequency stated in Table 3-12.

Table 4-2
QA/QC Procedures for EUBOILER2 GHG Measurements
Packaging Corporation of America - Filer City, MI Mill

Tier	Fuel	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Accepted Methods
1	Biogas	Fuel Usage	Annual	Aggregation Approach (one meter to powerhouse then directed to any boiler)	N/A	There are no calibration requirements for Tier 1 fuel flow metering devices; however, the Mill will ensure quality assurance, maintenance, and repair of each fuel flow metering device by operating according to manufacturer specifications.
2	Michicon Natural Gas (Meter No. 3 and 4)	Fuel Usage	Annual	Direct measurement by fuel flow meter at each source	N/A	Pursuant to §98.3(i)(4), initial and ongoing calibration of fuel billing meters are not required, provided that the fuel supplier and any unit combusting the fuel do not have any common owners and are not owned by subsidiaries or affiliates of the same company.
		HHV	Semi-Annual [(a)]	Samples shall be taken at a location in the fuel handling system that provides a sample representative of the fuel combusted. The fuel sampling and analysis will be performed by either the owner or operator, or the supplier of the fuel.	N/A	Chromatographic analysis together with standard heating values of the fuel constituents, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; or
						A consensus-based standard, if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB). Consensus-based standards include, but are not limed to, the following: ASTM D1826-94 (Reapproved 2003) Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter (incorporated by reference, see §98.7); or ASTM D3588-98 (Reapproved 2003) Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels (incorporated by reference, see §98.7); or ASTM D4891-89 (Reapproved 2006) Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion (incorporated by reference, see §98.7);or
						An industry standard practice. Industry standard practices include, but are not limited to, GPA Standard 2172-09 Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer (incorporated by reference, see §98.7).
2	West Bay Natural Gas (Meter No. 00-0600221)	Fuel Usage	Annual	Fuel usage is aggregated with Boiler 4a and monitored with a shared fuel flow meter.	N/A	Pursuant to §98.3(i)(4), initial and ongoing calibration of fuel billing meters are not required, provided that the fuel supplier and any unit combusting the fuel do not have any common owners and are not owned by subsidiaries or affiliates of the same company.
		HHV	Semi-Annual [(a)]	Samples shall be taken at a location in the fuel handling system that provides a sample representative of the fuel combusted. The fuel sampling and analysis will be performed by either the owner or operator, or the supplier of the fuel.	N/A	Chromatographic analysis together with standard heating values of the fuel constituents, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; or
						A consensus-based standard, if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB). Consensus-based standards include, but are not limed to, the following: ASTM D1826-94 (Reapproved 2003) Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter (incorporated by reference, see §98.7); or ASTM D3588-98 (Reapproved 2003) Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels (incorporated by reference, see §98.7); or ASTM D4891-89 (Reapproved 2006) Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion (incorporated by reference, see §98.7);or
						An industry standard practice. Industry standard practices include, but are not limited to, GPA Standard 2172-09 Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer (incorporated by reference, see §98.7).

[(a)] If HHV for a specific fuel type is collected at a monthly (or greater) frequency, the Mill must collect monthly fuel usage readings.

[(b)] Where more than one method is listed for a specific parameter, the Mill shall select one of the listed methods shown in order to perform measurements of that parameter in accordance with the minimum frequency stated in Table 3-12.

Table 4-3
QA/QC Procedures for EUBOILER4A GHG Measurements
Packaging Corporation of America - Filer City, MI Mill

Tier	Fuel	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Accepted Methods
1	Biogas	Fuel Usage	Annual	Aggregation Approach (one meter to powerhouse then directed to any boiler)	N/A	There are no calibration requirements for Tier 1 fuel flow metering devices; however, the Mill will ensure quality assurance, maintenance, and repair of each fuel flow metering device by operating according to manufacturer specifications.
2	Michicon Natural Gas (Meter No. 6740893)	Fuel Usage	Annual	Direct measurement by fuel flow meter at each source	N/A	Pursuant to §98.3(i)(4), initial and ongoing calibration of fuel billing meters are not required, provided that the fuel supplier and any unit combusting the fuel do not have any common owners and are not owned by subsidiaries or affiliates of the same company.
		HHV	Semi-Annual [a]	Samples shall be taken at a location in the fuel handling system that provides a sample representative of the fuel combusted. The fuel sampling and analysis will be performed by either the owner or operator, or the supplier of the fuel.	N/A	Chromatographic analysis together with standard heating values of the fuel constituents, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; or
						A consensus-based standard, if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB). Consensus-based standards include, but are not limed to, the following: ASTM D1826-94 (Reapproved 2003) Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter (incorporated by reference, see §98.7); or ASTM D3588-98 (Reapproved 2003) Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels (incorporated by reference, see §98.7); or ASTM D4891-89 (Reapproved 2006) Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion (incorporated by reference, see §98.7);or
						An industry standard practice. Industry standard practices include, but are not limited to, GPA Standard 2172-09 Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer (incorporated by reference, see §98.7).
2	West Bay Natural Gas (Meter No. 00-0600221)	Fuel Usage	Annual	Fuel usage is aggregated with Boiler 2 and monitored with a shared fuel flow meter.	N/A	Pursuant to §98.3(i)(4), initial and ongoing calibration of fuel billing meters are not required, provided that the fuel supplier and any unit combusting the fuel do not have any common owners and are not owned by subsidiaries or affiliates of the same company.
		HHV	Semi-Annual [a]	Samples shall be taken at a location in the fuel handling system that provides a sample representative of the fuel combusted. The fuel sampling and analysis will be performed by either the owner or operator, or the supplier of the fuel.	N/A	Chromatographic analysis together with standard heating values of the fuel constituents, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; or
						A consensus-based standard, if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB). Consensus-based standards include, but are not limed to, the following: ASTM D1826-94 (Reapproved 2003) Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter (incorporated by reference, see §98.7); or ASTM D3588-98 (Reapproved 2003) Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels (incorporated by reference, see §98.7); or ASTM D4891-89 (Reapproved 2006) Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion (incorporated by reference, see §98.7);or
						An industry standard practice. Industry standard practices include, but are not limited to, GPA Standard 2172-09 Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer (incorporated by reference, see §98.7).

[a] If HHV for a specific fuel type is collected at a monthly (or greater) frequency, the Mill must collect monthly fuel usage readings.

[b] Where more than one method is listed for a specific parameter, the Mill shall select one of the listed methods shown in order to perform measurements of that parameter in accordance with the minimum frequency stated in Table 3-12.

Table 4-4
QA/QC Procedures for EUBIOGASFLARE GHG Measurements
Packaging Corporation of America - Filer City, MI Mill

Tier	Fuel	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Accepted Methods
1	Biogas	Fuel Usage	Annual	Temperature Monitor	N/A	There are no calibration requirements for Tier 1 fuel flow metering devices; however, the Mill will ensure quality assurance, maintenance, and repair of the EUBIOGASFLARE temperature monitor that is used to derive a conservative estimate of biogas flow to the flare by operating the monitor according to manufacturer specifications.

Table 4-5
QA/QC Procedures for WWTP Building GHG Measurements
Packaging Corporation of America - Filer City, MI Mill

Tier	Fuel	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Accepted Methods
1	Propane	Fuel Usage	Annual	N/A - Purchase Records	N/A	Initial and ongoing calibration of measurement devices not required when the use of company records is acceptable for determining fuel usage.

Table 4-6
QA/QC Procedures for EUCOPELAND GHG Measurements
Packaging Corporation of America - Filer City, MI Mill

Tier	Fuel	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Accepted Methods
N/A	Spent Liquor Solids	Mass	Annual	Direct measurement of spent liquor solids fired by certified flow meter at source	N/A	T-650 om-05 Solids Content of Black Liquor, TAPPI (incorporated by reference in §98.7).
						Records of Measurement made with an online measurement system that determines the mass of spent liquor solids fired.
		HHV	Annual	Direct measurement of spent liquor solids fired	N/A	T684 om-06 Gross Heating Value of Black Liquor, TAPPI (incorporated by reference, see §98.7).
		CC	Annual	Direct measurement of spent liquor solids fired	N/A	ASTM D5373-08 Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal (incorporated by reference, see §98.7).
2	Natural Gas	Fuel Usage	Annual	Direct measurement by fuel flow meter at source	N/A	There are no calibration accuracy requirements for Tier 2 fuel flow metering devices; however, the Mill will ensure quality assurance, maintenance, and repair of each fuel flow metering device by operating according to manufacturer specifications.
		HHV	Semi-Annual	Samples shall be taken at a location in the fuel handling system that provides a sample representative of the fuel combusted. The fuel sampling and analysis will be performed by either the owner or operator, or the supplier of the fuel.	N/A	Chromatographic analysis together with standard heating values of the fuel constituents, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; or
						A consensus-based standard, if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB). Consensus-based standards include, but are not limed to, the following: ASTM D1826-94 (Reapproved 2003) Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter (incorporated by reference, see §98.7); or ASTM D3588-98 (Reapproved 2003) Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels (incorporated by reference, see §98.7); or ASTM D4891-89 (Reapproved 2006) Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion (incorporated by reference, see §98.7);or
						An industry standard practice. Industry standard practices include, but are not limited to, GPA Standard 2172-09 Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer (incorporated by reference, see §98.7).

Table 4-7
QA/QC Procedures for Make-Up Chemical Usage GHG Measurements
Packaging Corporation of America - Filer City, MI Mill

Tier	Make-Up Chemical	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Accepted Methods
N/A	Sodium Carbonate	Mass	Annual	N/A	N/A	Purchase records are used to determine the mass of sodium carbonate make-up chemicals that are added to the Mill's pulping process.

Table 4-8
QA/QC Procedures for Subpart II GHG Measurements
Packaging Corporation of America - Filer City, MI Mill

Tier	Biogas/ Wastewater	Parameter	Minimum Frequency per 40 CFR Part 98	Sampling Location	Initial Calibration Deadline	Reoccurring Calibration Requirements	Accepted Monitoring Methods
N/A	Biogas	Flowrate and Cumulative Volume of Recovered Gas	Continuously	Immediately after biogas reactor and bypass to flare, but prior to powerhouse.	Prior to the First Year of Reporting	Every two years (or at the minimum frequency specified by the manufacturer).	ASME MFC-3M-2004, ASME MFC-4M-1986, ASME MFC-6M-1998, ASME MFC-7M-1987, ASME MFC-11M-2006, ASME MFC-14M-2003, ASME MFC-18M-2001, Method 2A or 2D
		Methane Concentration	Continuously or Intermittently (i.e., at least once per calendar week that the biogas flow rate is above zero, with at least three days between measurements)	At a location near or representative of the location of the gas flow meter (on top of Building 55).	N/A	Use the procedures and frequencies specified by the device manufacturer.	Method 18 at 40 CFR Part 60, Appendix A-6, ASTM D1945-03, ASTM 1946-90, GPA Standard 2261-00, ASTM UOP539-97, or use of a total gaseous organic concentration analyzer pursuant to 40 CFR §98.354(g)(6)
	Wastewater	Flowrate	Once Per Week	The flow measurement location must correspond to the location used to collect samples analyzed for COD or BOD_5 concentration.	Prior to the First Year of Reporting	Every two years (or at the minimum frequency specified by the manufacturer).	ASME MFC-3M-2004, ASME MFC-5M-1985, ASME MFC-16-2007, ASTM D1941-91, ASTM D5614-94
		COD or BOD_5	Once Per Week	The measurement location must be representative of wastewater influent to the anaerobic wastewater treatment process, following all preliminary and primary steps.	N/A	N/A	Analytical methods for COD or BOD_5specified in 40 CFR §136.3 Table 1B You must collect a minimum of four sample aliquots per 24-hour period and composite the aliquots for analysis. You must collect a flow-proportional composite sample (either constant time interval between samples with sample volume proportional to stream flow, or constant sample volume with time interval between samples proportional to stream flow). Follow sampling procedures and techniques presented in Chapter 5, Sampling, of the "NPDES Compliance Inspection Manual," (incorporated by reference, see §98.7) or Section 7.1.3, Sample Collection Methods, of the "U.S. EPA NPDES Permit Writers' Manual," (incorporated by reference, see §98.7)

4.2 QA/QC OF GHG REPORTING PRACTICES

The Filer City Mill uses automated calculation tools to determine the mass of GHG emitted each year. Specifically, spreadsheets have been developed that include the necessary and appropriate emission calculations for updating each annual GHG Summary Report in U.S. EPA's e-GGRT database. The spreadsheets have been quality-assured to ensure that all calculations are being performed properly. Standard Mill QA procedures for data entry in the calculation spreadsheets are used. As each year of GHG emissions are determined, the current year's emissions are compared to the previous year's emissions for comparison. If there is more than a 10% difference in the mass of Mill-wide $MTCO_2e$ emitted, then additional review will be performed to ascertain the basis for the difference. If there is more than a 25% difference in the mass of GHG emitted from a single emissions unit or grouping of emissions units using the Aggregation of Units approach, then additional review will be performed to verify the basis for the difference between the two years of data.

4.3 TRAINING

The designated representative is responsible for ensuring that individuals involved in the reporting, recording, or calculation of GHG emissions are knowledgeable in the requirements specified in 40 CFR Part 98. This GHG Monitoring Plan is the primary source of information regarding the reporting requirements and the designated representative and alternate designated representative will use it as the basis for training other Filer City Mill personnel.

5. PROCESS OF DATA REPORTING AND ARCHIVING

This section of the GHG Monitoring Plan describes the general procedures for reporting GHG emissions to U.S. EPA, including descriptions of the company records and personnel utilized for collecting data and the process of archiving reported data and supporting information. In addition, the procedures for updating this GHG Monitoring Plan due to changes in either Mill operations or the requirements of 40 CFR Part 98 are also outlined in Section 5.

5.1 COMPANY RECORDS

The Filer City Mill utilizes "company records" for a significant portion of the GHG reporting process. In context of the GHG emission calculation process and fuel flow information, company records encompass the amount of fuel consumed by a stationary combustion unit (or by a group of such units), how the amount of fuel was determined, and any calculations performed to quantify fuel usage. Company records may include, but are not limited to, direct measurements of fuel consumption by gravimetric or volumetric means, tank drop measurements, and calculated values of fuel usage obtained by measuring auxiliary parameters such as steam generation or unit operating hours. Calculated values of fuel usage may be obtained by subtracting a quality-assured meter reading from a facility-wide billing meter reading. Fuel billing records obtained from fuel suppliers qualify as company records.

As discussed in Section 3.8 of this GHG Monitoring Plan, 40 CFR §98.35 addresses missing data related to stationary fuel combustion, 40 CFR §98.275 addresses missing data associated with pulp and paper manufacturing, and 40 CFR §98.355 addresses missing data associated with industrial wastewater treatment. The Filer City Mill recognizes that missing data are due to uncontrollable circumstances and not a failure on the part of the Mill to maintain equipment, to operate equipment properly, to plan for foreseeable problems, or to have personnel follow proper procedures. The missing data procedures apply to required parameters that are subject to some form of QA and are used in the computation of GHG emissions. The Mill will document and retain company records of the procedures used for all incidences of missing data.

The Filer City Mill will maintain all company records retained pursuant to this Rule on-site in either electronic or hard-copy format for a minimum of three years. The Mill will keep records that include a detailed explanation of how company records of measurements are used to estimate GHG emissions. In addition to retaining all background data used to calculate the facility's GHG emissions, the owner or operator will also document procedures used to ensure the accuracy of measurements, including, but not limited to calibration of weighing equipment, fuel flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices will be recorded and the technical basis for these estimates will be provided. The procedures used to convert spent pulping liquor flow rates to units of mass (i.e., spent liquor solids firing rates) also must be documented. Company records will be immediately made available upon request for verification of calculations and measurements.

5.2 COMPANY RESOURCES

The reporting of GHG will require the coordination of several operational areas at the Filer City Mill. Accounting, recovery and boiler operations, and the environmental departments will all have responsibilities related to data collection, data calculation, data management, and data reporting. A summary of the positions responsible for activities related to the reporting of GHG is provided in Table 5-1.

Table 5-1
Positions Involved with GHG Reporting
Packaging Corporation of America - Filer City, MI Mill

Task	Position Description	Frequency
Personnel Training	Environmental Manager	As Needed
Direct Fuel Measurement Device Calibration	E&I Manager	According to manufacturer specifications
Non-Direct Measurement Data Collection	Environmental Manager	Annual
Fuel Sampling	Environmental Manager	Refer to Tables 4-1 through 4-6.
GHG Emissions Calculations	Environmental Manager	Annual
Emissions QA	Environmental Manager	Annual
Inventory Report	Procurement Manager	Annual
Inventory QA	Accountant	Annual
Internal Verification/Validation	Environmental Manager	Annual

5.3 DATA REPORTING PROCESS

The Filer City Mill will electronically submit an annual GHG Summary Report to U.S. EPA via the Electronic Greenhouse Gas Reporting Tool (e-GGRT) database no later than March 31st (or as prescribed by U.S. EPA) of each calendar year, or any other reporting date promulgated by U.S. EPA, for GHG emissions associated with each previous calendar year. The information that is to be included in each annual GHG Summary Report is specified at 40 CFR §98.3(c), §98.36, §98.276, and §98.356 for Subparts A, C, AA, and II respectively. The Mill's automated calculation spreadsheets include all necessary and appropriate emission calculations to update U.S. EPA's e-GGRT database and generate each annual report.

The operators/owners of the Filer City Mill have assigned the designated representative identified in Table 5-2. An alternate designated representative who may act on behalf of the designated representative if so directed by the Manager of the Filer City Mill is also identified in Table 5-2. Either the appointed designated representative or the appointed alternate designated representative is responsible for electronically certifying each annual GHG Summary Report that is prepared in e-GGRT in accordance with 40 CFR Part 98 requirements. A copy of the current designated representative's Certification of Representation is included in Appendix A. The designated representative or alternate designated representative must examine all GHG calculations and supporting information prior to electronically certifying and submitting each GHG submittal. The actual submittal of each annual GHG Summary Report may also be performed by a third-party "agent" who is delegated by either the designated representative or alternate designated representative, provided that the delegated party is identified to U.S. EPA in an electronic notification. Once the information regarding the agent is received by U.S. EPA, the delegated agent remains delegated until such notice is provided removing the existing delegated agent. The Mill recognizes that when an agent submits a report, they are not agreeing to the Certification Statement, but rather submitting the Certification Statement on behalf of the designated representative or alternate designated representative who is agreeing to the Certification Statement. An agent is only authorized to make the electronic submission on behalf of the designated representative, not to sign (i.e., agree to) the certification statement.

5.4 CORRECTING REPORTED DATA

The annual GHG inventory reports will be corrected if errors are discovered. The Filer City Mill will submit a revised GHG report to U.S. EPA within 45 days of the identification of a reporting error. As part of the correction process, the Filer City Mill will identify the original error and provide the corrected data.

5.5 DATA ARCHIVING

Records related to the GHG inventory program will be maintained for a minimum of three years. The format of all retained records may be electronic or hard copy and must be made available to U.S. EPA for review upon request. A copy of the information that is required to be archived is contained in Table 5-3.

5.6 GHG MONITORING PLAN UPDATING

U.S. EPA requires that the GHG Monitoring Plan be updated to reflect changes to the Mill, to the approach used to calculate annual GHG, or to reflect changes in the requirements of Part 98. The Filer City Mill will review the GHG Monitoring Plan as needed. As part of the review, the following specific items will be considered:

- Applicability of new source categories.
- Changes to monitoring configurations.
- Changes to monitoring instrumentation.
- Improvements in monitoring techniques to reduce missing data or instrument downtime.
- Changes to QA/QC procedures.

To aid Mill personnel referencing the GHG Monitoring Plan in the future, the Filer City Mill documents and records all revisions to the GHG Monitoring Plan in Table 5-4.

Table 5-2
Designated Representative and Alternate Designated Representative
Packaging Corporation of America - Filer City, MI Mill

Contact Info	Designated Representative	Alternate Representative (if any)	Delegated Agent (if any)
Name	Andrew Richards	Sara Kaltunas	Megan Uhler
Title	Mill Manager	Environmental Manager	All4 Inc. Consulting Scientist
Address	2246 Udell St., Filer City, MI	2246 Udell St., Filer City, MI	P.O. Box 299, Kimberton, PA 19442
E-Mail Address	arichards@packagingcorp.com	skaltunas@packagingcorp.com	muhler@all4inc.com
Telephone	(231) 723-9951	(231) 723-9951 x465	(610) 933-5246 x132
Facsimile	(231) 723-1395	(231) 723-8140	(610) 933-5127

Table 5-3

Archived GHG Information

Packaging Corporation of America - Filer City, MI Mill

All subject units
Affected operations (pulp and paper, combustion, WWTP, etc.)
Raw data by subject units (fuel types, raw materials)
GHG calculations and methodology
Analytical results
Mill operating data or process information by year and used in GHG calculations
Copies of GHG annual reports
Missing data computations (dates, reason for missing data, actions to minimize future missing data)
Results of certifications and QA test of CEMs and other instrumentation used to generate GHG annual reports
Results of calibration accuracy tests
Revisions of annual reports

Table 5-4
GHG Monitoring Plan Revisions Log
Packaging Corporation of America - Filer City, MI Mill

Date	Authorized by	Revision Description ***Document Section/Page Number*** ***Regulatory Citation*** ***Brief Revision Description and Justification***
5/19/2010	M. Barry	Section 3 text and tables were revised to incorporate changes to the natural gas billing and flow meter configurations, to incorporate correct technical data, and to properly address source aggregation. Table 5-4 was added to track changes made to the Mill's GHG Monitoring Plan.
11/2/2011	G. Malinsky	Section 2 text and tables were revised to: - Update the current Month/Year for the purpose of defining the status of the rule at the time of the Monitoring Plan Revision. - Update the names of the sources at the Mill which fire biogas. - Add new language justifying why the Filer City Mill is not subject to certain subparts published after the October 30, 2009 version of the rule which could have potentially apply to the Mill.
11/2/2011	G. Malinsky	Section 3 text and tables were revised to: - Add more detail to the description of the Tier 3 and Tier 4 calculation methodologies. - Add more detail concerning available reporting alternatives, including a new description of the Monitored Common Stack approach, and new subsections concerning Group IDs GP-001 and GP-002. - Update the configurations and calculation methodologies of the Mill's Aggregated Source Groups. In the original version of the Plan, three (3) Aggregated Source Groups were proposed. However, based on more detailed metering information that was provided to ALL4 during preparation of the GHG Calculation Tool in 2011, the three (3) original Aggregated Source Groups were reduced to two (2). - Update the general descriptions and calculation methodologies of the Mill's individual emissions units. Updates include clarification that Boiler No. 1 is not currently capable of firing biogas, that emissions associated with bituminous coal combustion in Boiler No. 1 and Boiler No. 2 may be more accurately calculated utilizing the Tier 2 calculation methodology, that the Copeland Reactor and Thermal Oxidizer, which were originally proposed to report as two (2) individual sources, are now reported as EUCOPELAND, (or "Copeland Reactor with Thermal Oxidizer Control"), and that emissions associated with natural gas combustion in the Copeland Reactor with Thermal Oxidizer Control are now calculated utilizing a higher Tier 2 calculation methodology. - Update (and relocate) the worksheets detailing the types of data that the Mill is required to measure and report for each emissions unit based on revised calculation methodologies/unit configurations, and U.S. EPA clarifications during the first reporting exercise. - Update the procedures for replacing missing data in order to clarify that the Rule's substitute data provisions also apply to bituminous coal HHV data, and the annual throughput of either biogas or propane; incorporate recent amendments specifying that if multiple deliveries of coal are received from the same supply source in a given calendar month, the deliveries for that month may be considered, collectively, to comprise a fuel lot, requiring only one representative sample; and firmly assert that 40 CFR Part 98, Subpart AA does not include any missing data provisions for black liquor HHV, which is required to be sampled at least annually. - Update the description of GHG reporting process to include a discussion of the e-GGRT database.
11/2/2011	G. Malinsky	Section 4 text and tables were revised to: - Add more detail concerning how the Mill quality assures measurement of fuel or process-related fuel usage. - Remove specific methodologies for testing HHV. U.S. EPA has amended Part 98 to in most cases allow the use of a consensus-based standards organization method or industry standard practice.
11/2/2011	G. Malinsky	Section 5 text and tables were revised to: - Replace language concerning Best Available Monitoring Methods (BAMM) which were not utilized by the Mill during 2010 and are not available for use after March 31, 2010 with language concerning missing data provisions from Section 3. - Update the section entitled "Data Reporting Process" to reflect the actual reporting format and process defined by U.S. EPA after original promulgation of the rule.
11/2/2011	G. Malinsky	Appendix A has been revised to replace template Certificate of Representation correspondence with a copy of the actual Certificate of Representation which was signed during February 2011.
11/2/2011	G. Malinsky	Appendix B has been updated to reflect amendments to Table C-1, Table C-2, Table AA-1, and Table AA-2 that have occurred since the original version of the rule was promulgated.
1/6/2014	S. Kaltunas	Entire plan has been updated to incorporate requirements of Subpart II and to reflect November 29, 2013 amendments.
1/5/2017	S. Kaltunas	The following sections of the plan have been revised to clarify that coal is no longer fired in Boilers 1 or 2 as a strategy to comply with Boiler MACT: - Sections 3.4.1, 3.4.2, 3.8.1, and 4.1 - Table 3-26 and 3-27 The following tables have been updated to clarify applicable fuel throughput units of measurement: - Tables 3-13 through 3-20 The following tables have been updated to clarify that calcium carbonate is not currently added to the Mill's pulping process as make-up: - Tables 3-21 and 3-33
11/30/2017	S. Kaltunas	The Plan has been updated throughout to: - Include Boiler 1 among the aggregated GP-001 units firing natural gas. - Reflect the following: - U.S. EPA's October 24, 2014 revisions to 40 CFR Part 98 regarding confidentiality determinations and the availability of an alternative verification approach, in lieu of reporting certain data elements for which U.S. EPA identified disclosure concerns, when reporting GHG emissions. - U.S. EPA's December 9, 2016 revisions to 40 CFR Part 98 regarding Tier 2 HHV averaging equations and default Subparts C and AA emissions factors and HHVs. - U.S. EPA's December 9, 2016 revisions to Subpart II concerning the term "weekly average." - The Mill's obligation to annually analyze carbon content of spent liquor solids (in addition to HHV). - The correct units of measurement for weekly biogas flow to the flare and boilers. - Clarify the following: - That coal and fuel oil are not fired at the Mill. - That the Copeland Reactor is considered a "chemical recovery combustion unit at a stand-alone semichemical facility." - That the Copeland Reactor combusts "spent liquor solids" as opposed to just "black liquor solids" for consistency with Subpart AA rule language. - That there are two independent supply lines that deliver natural gas to the Mill. - That billing meters are exempted from 40 CFR Part 98 calibration requirements (as opposed to qualifying as certified equipment). - Summarize all Plan updates on Table 5-4. - Wordsmith and generally streamline the Monitoring Plan throughout.
8/7/2019	S. Kaltunas	The Plan has been updated as follows: - To omit all references to the monitoring and calculation of propane-related GHG from EUBIOGASFLARE under 40 CFR Part 98, Subpart C within the narrative (Section 3.4.4) and tables (Tables 3-7, historic Tables 3-15 and 3-23, Table 4-4). Emissions from flares are exempt under Subpart C, unless required by another subpart. - To clarify within Section 3.5.1 that it is appropriate for the Mill to utilize default emissions factors for Kraft mills when calculating emissions from EUCOPELAND per 40 CFR §98.273(b). - To clarify within Section 3.4.5 and Table 3-8 that purchase records are the "company records" used to determine annual throughput of propane to the WWTP building. - To update the Section 3.6 discussion concerning determination of biogas flow to EUBIOGASFLARE. - To clarify within Section 3.6 that biogas flow and methane are both measured at all relevant locations on a wet basis. - To update the date referenced in Section 3.7 to be "August 2019" instead of "December 2017." - To clarify within Section 3.8.3 and Table 4-8 the Mill's use of a multivariable flow meter which standardizes biogas flow measurements under Subpart II, and to omit obsolete monitoring of temperature and pressure due to use of a multivariable flow meter. - To update the Table 3-1 sample calculation for GP-002 to clarify the Mill's use of a temperature monitor for determination of biogas flow to EUBIOGASFLARE. - To update Table 5-2 to reference Andrew Richards as the Designated Representative. - To update Table 5-4 to summarize all changes.

APPENDIX A -
CERTIFICATE OF REPRESENTATION

APPENDIX B -
40 CFR PART 98 EMISSIONS FACTOR TABLES C-1, C-2, AA-1, AA-2, II-1, AND II-2

Table C-1 of Subpart C

Default CO_2 Emission Factors and High Heat Value for Various Types of Fuel

Revised December 9, 2016

Fuel Type	Default High Heat Value	Default CO_2 Emission Factor
Coal and Coke	**MMBtu/short ton**	**kg CO_2/MMBtu**
Anthracite	25.09	103.69
Bituminous	24.93	93.28
Subbituminous	17.25	97.17
Lignite	14.21	97.72
Coke	24.80	113.67
Mixed (Commercial Sector)	21.39	94.27
Mixed (Industrial Coking)	26.28	93.90
Mixed (Industrial Sector)	22.35	94.67
Mixed (Electric Power Sector)	19.73	95.52
Natural Gas	**MMBtu/scf**	**kg CO_2/MMBtu**
(Weighted U.S. Average)	1.026E-03	53.06
Petroleum Products - Liquid	**MMBtu/gallon**	**kg CO_2/MMBtu**
Distillate Fuel Oil No. 1	0.139	73.25
Distillate Fuel Oil No. 2	0.138	73.96
Distillate Fuel Oil No. 4	0.146	75.04
Residual Fuel Oil No. 5	0.140	72.93
Residual Fuel Oil No. 6	0.150	75.10
Used Oil	0.138	74.00
Kerosene	0.135	75.20
Liquefied Petroleum Gases (LPG)(1)	0.092	61.71
Propane(1)	0.091	62.87
Propylene(2)	0.091	67.77
Ethane(1)	0.068	59.60
Ethanol	0.084	68.44
Ethylene(2)	0.058	65.96
Isobutane(1)	0.099	64.94
Isobutylene(1)	0.103	68.86
Butane(1)	0.103	64.77
Butylene(1)	0.105	68.72
Naphtha (<410 deg F)	0.125	68.02
Natural Gasoline	0.110	66.88
Other Oil (>401 deg F)	0.139	76.22
Pentanes Plus	0.110	70.02
Petrochemical Feedstocks	0.125	71.02
Petroleum Coke	0.143	102.41
Special Naphtha	0.125	72.34
Unfinished Oils	0.139	74.54
Heavy Gas Oils	0.148	74.92
Lubricants	0.144	74.27
Motor Gasoline	0.125	70.22
Aviation Gasoline	0.120	69.25
Kerosene-Type Jet Fuel	0.135	72.22
Asphalt and Road Oil	0.158	75.36
Crude Oil	0.138	74.54
Petroleum Products - Solid	**MMBtu/short ton**	**kg CO_2/MMBtu**
Petroleum Coke	30.00	102.41
Petroleum Products - Gaseous	**MMBtu/scf**	**kg CO_2/MMBtu**
Propane Gas	2.516E-03	61.46
Other Fuels (Solid)	**MMBtu/short ton**	**kg CO_2/MMBtu**

Table C-2 of Subpart C

Default CH_4 and N_2O Emission Factors for Various Types of Fuel

Revised December 9, 2016

Fuel Type	Default CH_4 Emission Factor (kg CH_4/MMBtu)	Default N_2O Emission Factor (kg N_2O/MMBtu)
Coal and Coke (All fuel types in Table C-1)	1.1E-02	1.6E-03
Natural Gas	1.0E-03	1.0E-04
Petroleum Products (All fuel types in Table C-1)	3.0E-03	6.0E-04
Fuel Gas	3.0E-03	6.0E-04
Other Fuels-Solid	3.2E-02	4.2E-03
Blast Furnace Gas	2.2E-05	1.0E-04
Coke Oven Gas	4.8E-04	1.0E-04
Biomass Fuels - Solid (All fuel types in Table C-1, except wood and wood residuals)	3.2E-02	4.2E-03
Wood and wood residuals	7.2E-03	3.6E-03
Biomass Fuels - Gaseous (All fuel types in Table C-1)	3.2E-03	6.3E-04
Biomass Fuels - Liquid (All fuel types in Table C-1)	1.1E-03	1.1E-04

Note: Those employing this table are assumed to fall under the IPCC definitions of the “Energy Industry” or “Manufacturing Industries and Construction.” In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC “Energy Industry” category may employ a value of 1g of CH_4/mmBtu.

Table AA-1 of Subpart AA

Kraft Pulping Liquor Emissions Factors for Biomass-Based CO_2, CH_4, and N_2O

Revised December 9, 2016

Wood Furnish	Biomass-Based Emissions Factors (kg/MMBtu HHV)		
	CO_2[(a)]	CH_4	N_2O
North American Softwood	94.4	0.0019	0.00042
North American Hardwood	93.7	0.0019	0.00042
Bagasse	95.5	0.0019	0.00042
Bamboo	93.7	0.0019	0.00042
Straw	95.1	0.0019	0.00042

(a) Includes emissions from both the recovery furnace and pulp mill lime kiln.

Table AA-2 of Subpart AA

Kraft Lime Kiln and Calciner Emissions Factors for Fossil Fuel-Based CH_4 and N_2O

Revised December 9, 2016

Fuel	Fossil Fuel-Based Emissions Factors (kg/MMBtu HHV)			
	Kraft rotary lime kilns		Kraft calciners[(a)]	
	CH_4	N_2O	CH_4	N_2O
Residual Oil	0.0027	0.0000	0.0027	0.0003
Distillate Oil	0.0027	0.0000	0.0027	0.0004
Natural Gas	0.0027	0.0000	0.0027	0.0001
Biogas	0.0027	0.0000	0.0027	0.0001
Petroleum Coke	0.0027	0.0000	N/A	N/A[(b)]

Table II-1 of Subpart II

Emissions Factors

Factors	Default Value	Units
B_0-for facilities monitoring COD	0.25	Kg CH_4/kg COD
B_0-for facilities monitoring BOD_5	0.6	Kg CH_4/kg BOD_5
MCF-anaerobic reactor	0.8	Fraction.
MCF-anaerobic deep lagoon (depth more than 2 m)	0.8	Fraction.
MCF-anaerobic shallow lagoon (depth less than 2 m)	0.2	Fraction.

Table II-2 of Subpart II

Collection Efficiencies of Anaerobic Processes

Anaerobic Process Type	Cover Type	Methane Collection Efficiency
Covered anaerobic lagoon (biogas capture)	Bank to bank, impermeable	0.975
	Modular, impermeable	0.70
Anaerobic sludge digester; anaerobic reactor	Enclosed Vessel	0.99