PCA Filer City, Michigan Mill
Copeland Reactor CAM Plan (EUCOPELAND+DISTANK)
Particulate Matter (PM) Control

I. BACKGROUND

A. Emissions Unit

Description:	The Copeland Reactor is a fluidized bed reactor used to recover sodium carbonate from spent pulping liquor (black liquor). The Copeland Reactor is equipped with two cyclones, a venturi scrubber, wet electrostatic precipitators (WESP), and regenerative thermal oxidizer (RTO). The venturi scrubber controls the PM emissions. The WESP serves as protective equipment to prevent fouling of the RTO ceramic saddle bed (where the RTO was installed to comply with VOC destruction requirements).
Identification:	EUCOPELAND+DISTANK
Facility:	Packaging Corporation of America (PCA) – Filer City, Michigan Mill

B. Applicable Regulations, Emission Limit, and Monitoring Requirements

Regulation No.:	R 336.1331(1)(a)
Emission Limits:	0.20 lb PM/1000 lbs exhaust corrected to 50% excess air
Monitoring Requirements:	Monitor and record the differential pressure across the throat of the venturi scrubber at least once every 15 minutes.

C. Control Technology (Particulate Matter)

- Venturi Scrubber

II. MONITORING APPROACH

The key elements of the monitoring approach are presented below:

A. Indicator

The differential pressure across the venturi scrubber.

B. Measurement Approach

The differential pressure across the venturi scrubber is measured via a differential pressure transmitter.

C. Indicator Range

An excursion is defined as a one hour average differential pressure across the venturi scrubber less than 38 inches w.c.

D. Performance Criteria

Data Representativeness:	The differential pressure transmitter monitors the static pressures upstream and downstream of the scrubber's venturi throat.
Verification of Operational Status:	A differential pressure transmitter is currently installed, operated and maintained.
QA/QC Practices and Criteria:	Annually and as needed, the instrument is cleaned, zeroed out, and calibration checked.
Monitoring Frequency and Data:	Measured continuously.
Collection Procedure:	Measured continuously.

III. JUSTIFICATION

A. Background

The Copeland Reactor is equipped with a venturi scrubber in order to control emissions PM.

B. Rationale for Selection of Performance Indicator

A differential pressure transmitter continuously monitors the venturi scrubber to indicate proper functioning of the scrubber and to assure compliance with the PM limit.

C. Rationale for Selection of Indicator Level

Differential pressure readings within the range specified indicate that the venturi scrubber is properly functioning and effectively controlling emissions of PM.

PCA Filer City, Michigan Mill
Soda Ash Silo Baghouse CAM Plan (EUSODA-ASH)
Particulate Matter (PM) Control

I. BACKGROUND

A. Emissions Unit

Description:	The baghouse for the Soda Ash Silo (EUSODA-ASH) is subject to CAM.
Identification:	EUSODA-ASH
Facility:	PCA Filer City, Michigan Mill

B. Applicable Regulations, Emission Limit, and Current Title V Monitoring Requirements

Regulation No.:	R 336.1331(1), R 336.1201
Emission Limits:	0.10 lb/1000 lb exhaust gas calculated on a dry basis
Monitoring Requirements:	The differential pressure across the baghouse shall be continuously monitored and recorded once per day.

C. Control Technology

Baghouse

II. MONITORING APPROACH

The key elements of the monitoring approach are presented below:

A. Indicator

Pressure drop across the baghouse and the absence of visible emissions.

B. Measurement Approach

Differential pressure gauges.

C. Indicator Range

Pressure drop should be greater than or equal to 0.0 inches water column and less than or equal to 15 inches water column.

D. Performance Criteria

Data Representativeness:	Pressure drop is measured as the difference in pressure between the inlet and outlet of the baghouse.

Verification of Operational Status:	Not applicable. Applies only to new or modified monitoring systems. The pressure differential gauges for the soda-ash silo baghouse are existing monitors and do not need to be modified.
QA/QC Practices and Criteria:	Inspections of the baghouse are conducted and any problems are noted and corrected promptly.
Monitoring Frequency and Data Collection Procedure:	Pressure drop across the baghouse is monitored and recorded daily while the unit is operating. Readings are also recorded continuously in the process information system for real-time feedback.

III. JUSTIFICATION

A. Background

The soda-ash silo is used to store ash collected from the boilers. The silo is equipped with a baghouse to control particulate matter (PM) emissions.

B. Rationale for Selection of Performance Indicator

Pressure drop across a baghouse is an indicator of the resistance to flow through the control device and the effectiveness of the cleaning system. The baghouse is designed to operate within a certain pressure drop range. Operation outside of that range is an indication that the baghouse is not performing as designed and may not be effectively removing particulate matter from the gas stream. A high pressure drop can indicate that the bags have become blinded, or the bag cleaning system or dust removal system is malfunctioning. A low pressure drop can indicate that the bags are being over-cleaned (the bags must be coated with some dust to clean effectively), there are holes or tears in one or more bags, that one or more bags have come loose, or that the pressure monitoring device is plugged.

C. Rationale for Selection of Indicator Level

The pressure drop indicator ranges selected for the baghouse are based on a review of the differential pressure at the baghouse during transfers.

PCA Filer City, Michigan Mill
Fly Ash Silo Baghouse CAM Plan (EUFLYASH)
Particulate Matter (PM) Control

I. BACKGROUND

A. Emissions Unit

Description:	The baghouse for the Fly Ash Silo (EUFLYASH) is subject to CAM.
Identification:	EUFLYASH
Facility:	PCA Filer City, Michigan Mill

B. Applicable Regulations, Emission Limit, and Current Title V Monitoring Requirements

Regulation No.:	R 336.1331(1), R 336.1201
Emission Limits:	0.10 lb/1000 lb exhaust gas calculated on a dry basis
Monitoring Requirements:	Monitor and record pressure drop across baghouse once per day when the fly ash silo is operating.

C. Control Technology

Baghouse

II. MONITORING APPROACH

The key elements of the monitoring approach are presented below:

A. Indicator

Pressure drop across the baghouse and the absence of visible emissions.

B. Measurement Approach

Differential pressure gauges.

C. Indicator Range

Pressure drop should be greater than or equal to 2.0 inches water column and less than or equal to 6.0 inches water column.

D. Performance Criteria

Data Representativeness:	Pressure drop is measured as the difference in pressure between the inlet and outlet of the baghouse.
Verification of Operational Status:	Not applicable. Applies only to new or modified monitoring systems. The pressure differential gauge for the fly ash silo baghouse is an existing monitor and does not need to be modified.

QA/QC Practices and Criteria:	Calibrate, maintain, and operate equipment and instrumentation in accordance with manufacturer's specifications. Inspections of the baghouse are conducted and any problems are noted and corrected promptly.
Monitoring Frequency and Data Collection Procedure:	Pressure drop across the baghouse is monitored and recorded daily while the unit is operating. Readings are recorded and maintained on a log sheet.

III. JUSTIFICATION

A. Background

The fly ash silo is used to store fly ash collected from the boilers. The silo is equipped with a baghouse to control particulate matter (PM) emissions.

B. Rationale for Selection of Performance Indicator

Pressure drop across a baghouse is an indicator of the resistance to flow through the control device and the effectiveness of the cleaning system. The baghouse is designed to operate within a certain pressure drop range. Operation outside of that range is an indication that the baghouse is not performing as designed and may not be effectively removing particulate matter from the gas stream. A high pressure drop can indicate that the bags have become blinded, or the bag cleaning system or dust removal system is malfunctioning. A low pressure drop can indicate that the bags are being over-cleaned (the bags must be coated with some dust to clean effectively), there are holes or tears in one or more bags, that one or more bags have come loose, or that the pressure monitoring device is plugged.

C. Rationale for Selection of Indicator Level

The pressure drop indicator ranges selected for the baghouse are the manufacturer's recommendations to ensure effective particulate removal based on the design conditions for each filter.

Operating Program to Control Fugitive Dust

Packaging Corporation of America
2246 Udell Street
Filer City, MI 49634

May 1, 2018

Uncontrolled Emissions of Fugitive Dust

The following table lists the calculated potential uncontrolled emissions of fugitive dust for the Packaging Corporation of America Filer Mill:

PM Emissions (TPY)	Source
13.47	Material Handling
2.60	Unpaved Roads
7.03	Paved Roads
0..85	Wind Erosion

The supporting calculations and data tables are included in the appendix. These figures represent the maximum potential uncontrolled emissions from the mill. Material handling emissions were calculated using 2015 throughput and silt content measured onsite. The average wind speed was pulled from the 2012-2017 dataset. Unpaved road and paved road emissions were calculated using the 2012 vehicle miles traveled. Wind erosion emissions were chosen by comparing emissions from 2012-2016 and using the highest emission.

The uncontrolled emissions of fugitive dust are less than 50 tons per year from storage piles and 100 tons per year from all sources. Therefore, Rule 324.5524 (3) (i) is not applicable to the facility.

Material Storage Piles

The mill has outdoor storage piles of logs, chips, bark, and bales of recycle paper.

Timber handling machines are used to unload logs from trucks and to transport them to storage piles, and then to the mill for processing.

Chip trucks are unloaded in a chip dumper that elevates the truck into a near-vertical position so the chips can fall out by gravity. Front-end loaders transport chips for storage and for processing. Front-end loaders also transport bark that has been removed from logs.

Forklift trucks are used to unload bales of waste paper from trucks and transport them to storage piles and then to the mill for processing. Waste paper bales are tightly compacted with large individual pieces. Fugitive dust emissions from these piles are considered negligible.

Minimum drop heights are used in all unloading and transfer operations.

Spills are cleaned up promptly.

Roads, Parking Lots, and Traffic Areas around Storage Piles

The mill has both paved and unpaved roads, paved and unpaved parking lots, and paved and unpaved traffic areas around storage piles.

In addition to the traffic that serves outdoor storage piles, there is some other regular traffic:

- Finished paper product from inside the mill is loaded into rail cars or trucks.
- Primary sludge dumpsters are hauled to a landfill from Building 56 or the bin 115 by truck.
- Secondary sludge is hauled either for land application or to a landfill from secondary treatment by truck.
- Solid waste is occasionally hauled to or from Bin #115 by truck.
-
- In addition, there is traffic from maintenance activities and general operations.

Traffic in the mill is limited to 10 miles per hour. Signs are posted.

Unpaved surfaces are inspected frequently and dust suppressants are applied by a contractor as necessary to prevent fugitive dust emissions. A typical application rate is 2000 gallons of 28% calcium chloride per mile of two-lane road. Records are kept of purchase orders for dust suppressants.

Paved surfaces are also inspected frequently and cleaned with a street sweeper as necessary to prevent fugitive dust emission. This is typically done during or shortly after a rain to minimize sweeper dust. Records are maintained of paved surface sweeping.

The mill also has a wash-up building where vehicles are cleaned as necessary.

The mill operates a weather station for the National Weather Service and maintains daily record of precipitation.

Fugitive Dust Control Equipment for Coal Handling

Coal Handling is covered by EUCOALHANDLING in the Renewable Operating Permit (ROP).

The mill has not used coal as a fuel source since the beginning of 2014. However, if coal firing resumes, the following fugitive dust control equipment would apply:

Coal is received by boat. It is off-loaded and stored on the coal dock. It is then hauled to a covered conveyor system by front-end loader for transfer to coal bunkers.

The ROP requires the mill to perform non-certified visible emissions observations from the fabric filter exhaust points once a week when the equipment is operating. Records of emissions and corrective actions are kept onsite.

Fugitive Dust Control Equipment for Chip Handling

Chip Handling is covered by EUWOODCHIPTRAN in the ROP.

Wood chips are received by truck or they may be made onsite by chipping logs. They are screened and transferred to chip bins in the mill. Chip transfer operations involve blowing, belt conveyors, and front-end loaders. There are cyclones at the blower discharge points.

The ROP requires the mill to perform non-certified visible emissions observations from the cyclones once a week when the equipment is operating. Records of emissions and corrective actions are kept onsite.

Fugitive Dust Control Equipment for Soda Ash Handling

Soda Ash Handling is covered by EUSODA-ASH in the ROP.

Soda ash is received by rail and transferred to a silo by an enclosed blowing system that has a baghouse at the discharge point. It is then transferred to a dissolving tank. A minimum drop height is used.

The mill has pressure gauges at the entrance and exit of the baghouse, and the operator is in position to see a ruptured bag. The normal operating range is identified in the Source-Wide Malfunction Abatement Plan (MAP), and records are kept of any excursions and the corrective actions taken.

Fugitive Dust Control Equipment for Fly Ash Handling

Fly Ash Handling is covered by EUFLYASH in the ROP.

The mill has not used coal as a fuel source since the beginning of 2014. However, if coal firing resumes, the following fugitive dust control equipment would apply:

Fly Ash from the boiler baghouse is transferred to a collection tank by an enclosed blowing system that has a separate baghouse at the discharge point. The ash is then loaded into dump trucks via an enclosed tube for transport to a landfill. Water is added to the fly ash during the transfer in order to minimize fugitive dust and improve handling characteristics. The trucks are not filled above 6” from the top and they are covered with a tarpaulin for transport.

The ROP requires the mill to continuously measure the differential pressure across the baghouse. The normal operating range is identified in the Source-Wide Malfunction Abatement Plan (MAP), and records are kept of any excursions and the corrective actions taken.

Fugitive Dust Control Equipment for Pellet Handling

Pellet Handling is covered by EUPELLET in the ROP.

Pellets and bed material from the Copeland Reactor are transferred to a collection tank by an enclosed blowing system that has a baghouse at the discharge point. If the material is subsequently disposed of, instead of being reused, minimum drop heights are used in loading trucks.

Fugitive Dust Control Equipment for Bark Grinding

Starting July 2017, PCA also operates a portable horizontal hammer grinder to process bark rejected from the on-site bark hog. This portable bark grinder is brought onsite approximately 8 weeks per year and is not considered a significant source of additional fugitive emissions.

Activities from Previous Year

Road brining occurred 5/23/17 at the Mill and at the M-55 bark site.
Road brining was approved again 8/28/17 but was not ordered.
Street sweeping occurred on 9/5/17 at the Mill.

Appendices

1. Calculation of potential uncontrolled fugitive dust emissions.
2. Plant Map showing approximate location of storage piles, conveyors, traffic patterns, and fugitive dust control equipment.

Wood Chip Unloading	Emit Factor	Units	Total Emission	Units	Source/Comment
PM	3.07E-02	lb/ton	17161.1	lbs/year	Ap-42 Ch. 13.2.4 Eq. 1. PM10 & PM2.5 "k" values per NCASI Bulletin Vol. 40, No. 8, 10/1/2014; assume 3 drops
PM10	1.25E-04		69.6	lbs/year	
PM2.5	2.08E-05		11.6	lbs/year	
Bark/Refuse Unloading	**Emit Factor**	**Units**			**Source/Comment**
PM	2.55E-02	lb/ton	723.9	lbs/year	Ap-42 Ch. 13.2.4 Eq. 1. PM10 & PM2.5 "k" values per NCASI Bulletin Vol. 40, No. 8, 10/1/2014; assume 3 drops
PM10	5.18E-05		1.5	lbs/year	
PM2.5	6.90E-06		0.2	lbs/year	
Logs	**Emit Factor**	**Units**			**Source/Comment**
PM	2.55E-02	lb/ton	9049.3	lbs/year	Ap-42 Ch. 13.2.4 Eq. 1. PM10 & PM2.5 "k" values per NCASI Bulletin Vol. 40, No. 8, 10/1/2014; assume 2 drops.
PM10	1.04E-04		36.7	lbs/year	
PM2.5	1.73E-05		6.1	lbs/year	

	Bark Handling	Chip Handling	Logs	
k (PM)	0.74	0.74	0.74	
k (PM10)	0.0015	0.003	0.003	
k (PM2.5)	0.0002	0.0005	0.0005	
Silt content (%) <75 um	0.99000%	0.04600%	0.51800%	Measured in 2015
Mean wind speed (mph)	7	7	7	
Moisture content (%)	0.5	0.438	0.5	
PM Emit Factor (lb/ton)	2.55E-02	3.07E-02	2.55E-02	
PM10 Emit Factor (lb/ton)	5.18E-05	1.25E-04	1.04E-04	
PM2.5 Emit Factor (lb/ton)	6.90E-06	2.08E-05	1.73E-05	
2017 Annual Throughput (tons)	28344.72	558236	354309	

Unpaved Roads	2012 VMT	Max VMT	PM lb/yr Actual	PM-10 lb/yr Actual	PM-2.5 lb/yr Actual	PM lb/yr Max	PM-10 lb/yr Max	PM-2.5 lb/yr Max
Roadway Segment W	830	995	687	97	10	824	117	12
Roadway Segment X	162	195	135	19	2	161	23	2
Roadway Segment Y	487	585	404	57	6	484	68	7
Roadway Segment Z	1,101	1,321	911	129	13	1094	155	15
Roadway Segment AA	225	270	187	26	3	224	32	3
Roadway Segment AB	2,184	2,621	1809	256	26	2171	307	31
Roadway Segment AC	249	299	206	29	3	247	35	3
E, PM-30	0.8959136							
E, PM-10	0.12665							
E, PM-2.5	0.012665							
E_{ext}, PM-30	0.8281678							
E_{ext}, PM-10	0.1170732							
E_{ext}, PM-2.5	0.0117073							

AP-42 13.2.2 Eq 1a : $E = k (s/12)^a (W/3)^b$

Where:		
E = size-specific emission factor (lb/VMT)		
s = silt content, % (Worst case, Table 13.2.2-3 Industrial Rd Range)	25.2%	
W = mean vehicle weight, tons	28	
S = Vehicle speed, mph	10	
k, PM-30	4.9	
k, PM-10	1.5	
k, PM-2.5	0.15	
a, PM-30	0.7	
a, PM-10 & PM2.5	0.9	
b, PM-30, PM-10, PM2.5	0.45	
P = day/yr w/ precip >0.01"	27.6	*see file for weather data*

AP-42 13.2.2 Eq 1a : $E = k (s/12)^a (W/3)^b$

AP-42 13.2.2 Eq 2 : $E_{ext} = E[(365-P)/365]$

VMT=Vehicle Miles Traveled

Paved Roads	2012 VMT	Max VMT	PM lb/yr Actual	PM-15 lb/yr Actual	PM-10 lb/yr Actual	PM-2.5 lb/yr Actual	PM lb/yr Max	PM-15 lb/yr Max	PM-10 lb/yr Max	PM-2.5 lb/yr Max
Roadway Segment A	1,327	1,593	231	57	46	11	277	68	55	14
Roadway Segment B	9,332	11,199	1626	399	325	80	1951	479	390	96
Roadway Segment C	3,526	4,231	614	151	123	30	737	181	147	36
Roadway Segment D	1,694	2,032	295	72	59	14	354	87	71	17
Roadway Segment E	4,203	5,044	732	180	146	36	879	216	176	43
Roadway Segment F	1,599	1,918	279	68	56	14	334	82	67	16
Roadway Segment G	778	933	135	33	27	7	163	40	33	8
Roadway Segment H	648	778	113	28	23	6	135	33	27	7
Roadway Segment I	194	232	34	8	7	2	40	10	8	2
Roadway Segment J	15,153	18,184	2640	648	528	130	3168	778	634	156
Roadway Segment K	830	995	145	35	29	7	173	43	35	9
Roadway Segment L	778	933	135	33	27	7	163	40	33	8
Roadway Segment M	197	236	34	8	7	2	41	10	8	2
Roadway Segment N	622	747	108	27	22	5	130	32	26	6
Roadway Segment O	3,111	3,733	542	133	108	27	650	160	130	32
Roadway Segment P	4,839	5,807	843	207	169	41	1012	248	202	50
Roadway Segment Q	4,372	5,247	762	187	152	37	914	224	183	45
Roadway Segment R	2,592	3,111	452	111	90	22	542	133	108	27
Roadway Segment S	7,259	8,710	1265	310	253	62	1517	372	303	74
Roadway Segment T	802	962	140	34	28	7	168	41	34	8
Roadway Segment U	1,711	2,053	298	73	60	15	358	88	72	18
Roadway Segment V	1,244	1,493	217	53	43	11	260	64	52	13
Roadway Segment AD	435.511	523	76	19	15	4	91	22	18	4

E_{ext}, PM-30	0.17
E_{ext}, PM-15	0.04
E_{ext}, PM-10	0.03
E_{ext}, PM-2.5	0.01

Equation from AP-42 Chapter 13.2

$E_{ext} = [k(sL)^{0.91} * (W)^{1.02}](1-P/4N)$

E_{ext} =Particulate emission factor

sL=Silt loading (g/M^2)	2.4	
P = day/yr w/ precip >0.01"	27.6	*see file for weather data*
W = mean vehicle weight, tons	7	
N= Number of days considered in P calc.	365	
k-PM 2.5	0.00054	
k-PM 10	0.0022	
k-PM 15	0.0027	
k-PM 30	0.011	

Wood Chip Unloading	Emit Factor	Units	Actual Emissions	Units
PM	9.20E+01	g/m^2	1082	Lbs/Year
Bark/Refuse Unloading				
PM	9.20E+01	g/m^2	111	Lbs/Year
Logs				
PM	9.20E+01	g/m^2	505	Lbs/Year

AP-42 Chapter 13.2.5	Bark Handling	Chip Handling	Logs
Silt content (%) <75 um	0.99%	0.05%	0.52%
Moisture content (%)	0.5	0.438	0.5
Height of pile (m)	10	20	14
Pile Length (m)	25	80	50
Pile width (m)	10	40	30
Total surface area (m2)	1305	12702	5921
Threshold friction velocity u*t (m/s)	1.02	1.02	1.02

Pile surface area by wind regieme (m^2)

.2a	65.3	635.1	296.0
.2b	26.1	254.0	118.4
.2c	378.5	3683.5	1717.0
.6a	339.4	3302.4	1539.4
.6b	313.3	3048.4	1420.9
0.9	182.7	1778.2	828.9

Potential to Emit by Year

2012	37.22
2013	69.93354
2014	43.5848
2015	66.56367
2016	30.32218
2017	92.04
Max	92.04

PACKAGING CORPORATION OF AMERICA, FILER CITY, MICHIGAN
SUMMARY OF PAVED AND UNPAVED ROADWAY DATA

Description	Distance* (ft)	Avg. Daily Vehicle Count (number of trucks)	Annual Distance Traveled (Miles)	Roadway Segments Utilized	Roadway Surface	
Roadways Segments						
Roadway Segment A	160	120	1,327.3		Paved	
Roadway Segment B	600	225	9,332.4		Paved	
Roadway Segment C	425	120	3,525.6		Paved	
Roadway Segment D	350	70	1,693.7		Paved	
Roadway Segment E	200	304	4,203.0		Paved	
Roadway Segment F	925	25	1,598.6		Paved	
Roadway Segment G	450	25	777.7		Paved	
Roadway Segment H	375	25	648.1		Paved	
Roadway Segment I	70	20	193.6		Paved	**
Roadway Segment J	800	274	15,153.0		Paved	**
Roadway Segment K	300	40	829.5		Paved	
Roadway Segment L	225	50	777.7		Paved	
Roadway Segment M	190	15	197.0		Paved	
Roadway Segment N	150	30	622.2		Paved	**
Roadway Segment O	900	50	3,110.8		Paved	
Roadway Segment P	1,000	70	4,839.0		Paved	
Roadway Segment Q	575	110	4,372.4		Paved	
Roadway Segment R	750	50	2,592.3		Paved	
Roadway Segment S	600	175	7,258.5		Paved	
Roadway Segment T	290	40	801.9		Paved	
Roadway Segment U	165	75	1,710.9		Paved	**
Roadway Segment V	450	40	1,244.3		Paved	
Roadway Segment W	1,500	4	829.5		Unpaved	**
Roadway Segment X	235	5	162.5		Unpaved	**
Roadway Segment Y	282	25	487.4		Unpaved	
Roadway Segment Z	398	40	1,100.5		Unpaved	
Roadway Segment AA	163	20	225.4		Unpaved	
Roadway Segment AB	790	40	2,184.5		Unpaved	
Roadway Segment AC	120	15	248.9		Unpaved	**
Roadway Segment AD	70	45	435.5		Paved	**
Truck Type						
Chips	N/A	45.0		A, B		
Logs	N/A	0.0		A, B		
Recycle	N/A	32.0		A, C, D, E, F		
Polymer	N/A	1.0		A, C, D, E, F		
Product	N/A	21.0		A, C, D, E		
Solid Waste	N/A	20.0		A, C, D, E, F		
Coal Pile to Mill	N/A	32.0		H		
Chips to Pile	N/A	264.0		G		
Chips to Hopper	N/A	284.0		H		
Bark Fines	N/A	25.0		I		
General Mill Traffic	N/A	0.0		A, B, C, D, E, F, G, H, I		

*- All distances are measured one-way. All measurements have been rounded to compensate for innacuracies

**- multiplied by two for round trip

Paved

Truck Type	Description	Truck Weight, tons	Source	Loads/year	Avg Load Weight, tons	Total Weight, tons	Weighted Avg Segment
Chip Trucks	Tractor with 53' box trailer	21.3	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	6740	36	58	1.15
Round Wood Trucks	Tractor with tandem log trailer/ self unloaders	25.35	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	8003	47	73	1.72
Secondary Sludge Trucks	Tractor with tandem self dumping trailers	25.5	PCA Scale tare weight	944	47	73	0.20
Dump Trucks to Landfill	Double axle 4x4 dump trucks or double axle roll-off transport trucks	21	PCA Scale tare weight	4702	10	31	0.43
In-Mill Chip Transport	John Deer 844k Loaders with Modified Chip Bucket, Liebherr Clamp Loaders	37.7065	https://www.deere.com/en/loaders/wheel-loaders/844k-ii-wheel-loader/	273204	3	41	33.25
Bark/Fines Movement	John Deer 844k Loaders with Modified Chip Bucket, Liebherr Clamp Loaders	37.7065	https://www.deere.com/en/loaders/wheel-loaders/844k-ii-wheel-loader/	1688	5	42	0.21
Light Duty Pickup	Crew Cab 4x4 Pickup Truck	2.6	https://www.kbb.com/chevrolet/silverado-1500-crew-cab/2008/?bodystyle=pickup&intent=buy-used	8760	0	3	0.07
Bark/Fines Shipping	Tractor with 40' self dumping trailer or moving bottom	26	PCA Scale tare weight	2154	28	54	0.35
Finished Paper Shipping	Tractor with 53' box trailer	21.3	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	21051	22	43	2.67
Secondary Fiber Receiving	Tractor with 53' box trailer	21.3	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	10000	20	42	1.23
Total				337246			41

Unpaved

Truck Type	Description	Truck Weight, tons	Source	Loads/year	Avg Load Weight, tons	Total Weight, tons	Weighted Avg Segment
Chip Trucks	Tractor with 53' box trailer	21.3	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	6740	0	21	6.11
Round Wood Trucks	Tractor with tandem log trailer/ self unloaders	25.35	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	8003	0	25	8.63
Secondary Sludge Trucks	Tractor with tandem self dumping trailers	25.5	PCA Scale tare weight	0	47	73	0.00
Dump Trucks to Landfill	Double axle 4x4 dump trucks or double axle roll-off transport trucks	21	PCA Scale tare weight	0	10	31	0.00
In-Mill Chip Transport	John Deer 844k Loaders with Modified Chip Bucket, Liebherr Clamp Loaders	37.7065	https://www.deere.com/en/loaders/wheel-loaders/844k-ii-wheel-loader/	0	3	41	0.00
Bark/Fines Movement	John Deer 844k Loaders with Modified Chip Bucket, Liebherr Clamp Loaders	37.7065	https://www.deere.com/en/loaders/wheel-loaders/844k-ii-wheel-loader/	0	5	43	0.00
Light Duty Pickup	Crew Cab 4x4 Pickup Truck	2.6	https://www.kbb.com/chevrolet/silverado-1500-crew-cab/2008/?bodystyle=pickup&intent=buy-used	8760	0	3	1.05
Bark/Fines Shipping	Tractor with 40' self dumping trailer or moving bottom	26	PCA Scale tare weight	0	28	54	0.00
Finished Paper Shipping	Tractor with 53' box trailer	21.3	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	0	22	43	0.00
Secondary Fiber Receiving	Tractor with 53' box trailer	21.3	https://www.allencounty.us/homeland/images/lepc/docs/TruckTrailerGuide.pdf	0	20	42	0.00
Total				23503			16

2012	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (	Events	3 Day Max
1	37	36	33	34	31	28	93	82	70	29.83	29.64	29.47	10	6	1	26	11	38	0.15		31
4	30	21	12	25	15	9	93	81	69	29.99	29.91	29.84	10	10	10	14	6	18	0		14
7	39	36	30	30	25	18	75	64	55	30.21	29.93	29.68	10	10	1	18	12	25	0		18
10	46	35	24	30	28	21	93	71	49	29.99	29.9	29.77	10	10	2	14	7	21	0		14
13	28	24	21	27	18	12	93	76	63	29.93	29.66	29.39	10	6	2	16	3	28	0		16
16	39	30	21	30	24	12	86	77	68	30.04	29.82	29.73	10	10	8	9	6	-	0		24
19	26	17	8	21	6	0	86	71	62	30.06	29.83	29.61	10	4	0	26	15	37	0		26
22	33	22	12	30	18	7	93	77	56	30.16	29.92	29.62	10	8	2	16	9	24	0		26
25	35	30	24	28	23	19	86	75	65	30.36	30.28	30.17	10	10	6	12	2	17	0		17
28	35	30	26	32	24	16	93	78	59	29.92	29.76	29.63	10	6	0	26	13	32	0.16		26
31	50	36	21	39	31	18	93	81	66	29.8	29.73	29.67	10	8	2	16	6	25	0		16
3	37	32	28	32	29	23	93	80	65	30.49	30.45	30.4	10	7	2	9	1	-	0		10
6	35	30	26	28	27	25	93	78	70	30.12	30.07	30.02	10	8	3	15	7	21	0		15
9	35	32	28	18	16	12	64	53	44	30.18	30.1	30	10	10	10	17	11	23	0		20
12	30	24	19	14	11	9	68	60	47	30.19	30.15	30.1	10	10	10	18	15	26	0		20
15	39	34	30	32	29	25	93	78	70	30.06	30.02	29.95	10	9	4	12	5	18	0		20
18	33	26	19	30	19	12	93	68	55	30.24	30.11	29.92	10	9	3	17	9	25	0		17
21	37	34	32	34	25	19	93	70	56	29.98	29.67	29.51	10	9	2	16	7	20	0.05		22
24	32	30	28	27	25	21	86	80	64	29.74	29.59	29.51	10	5	1	20	10	24	0.01		20
27	42	37	32	30	22	18	70	60	52	30.36	30.08	29.9	10	10	10	25	16	36	0		25
1	37	34	32	32	30	28	93	83	70	29.83	29.71	29.49	10	8	2	12	5	-	0.01		21
4	24	22	19	19	15	10	86	74	63	29.93	29.83	29.75	10	9	5	10	6	-	0		20
7	60	56	53	46	38	30	67	49	41	29.89	29.82	29.7	10	10	9	26	17	40	0		26
10	51	37	23	28	15	7	63	44	35	30.51	30.28	30.08	10	10	10	23	10	38	0		23
13	55	50	44	43	36	28	82	62	36	30.05	29.93	29.78	10	10	8	21	13	28	0		21
16	73	56	39	54	41	36	87	76	50	30.1	30.06	30.03	10	10	8	13	4	-	0		22
19	80	68	55	61	56	52	88	64	47	30.02	30	29.95	10	10	5	15	6	22	0		21
22	80	66	53	59	52	46	94	66	42	30.14	30.1	30.06	10	10	5	12	3	-	0	Thunderstorm	13
25	55	48	41	43	37	28	87	66	50	30.14	30.03	29.93	10	10	10	16	6	23	0		18
28	64	54	44	46	37	32	71	61	52	29.93	29.74	29.64	10	10	10	22	15	32	0		22
31	44	38	33	30	29	27	81	71	57	30.04	30.01	29.95	10	10	10	10	4	16	0		16
3	53	48	42	43	34	28	76	60	46	30.01	29.95	29.91	10	10	8	15	7	17	0.08		18
6	48	37	26	28	24	19	86	59	40	30.36	30.3	30.22	10	10	10	15	6	-	0		17
9	51	40	28	34	27	23	86	60	33	30.01	29.92	29.88	10	10	10	21	8	28	0		22
12	48	34	21	34	27	19	93	70	43	30.28	30.23	30.19	10	10	5	14	3	16	0		23
15	69	63	57	61	57	54	94	84	64	29.83	29.7	29.6	10	7	2	16	8	29	0.52	Thunderstorm	29
18	60	43	26	45	32	21	93	65	36	30.32	30.09	29.9	10	10	7	18	6	30	0.07		18
21	48	38	28	32	25	21	93	59	34	30.09	30.04	30.01	10	9	0	16	6	24	0		22
24	55	47	37	30	27	21	75	48	26	29.74	29.7	29.67	10	10	10	18	10	24	0		24
27	46	34	23	28	20	12	86	52	25	30.29	30.24	30.18	10	10	9	18	6	23	0		18
30	53	46	39	43	37	21	87	71	28	30.16	30	29.92	10	10	5	15	7	17	0.13		15
3	71	63	55	63	58	54	94	85	68	29.96	29.89	29.84	10	9	0	16	6	23	2.94	Thunderstorm	16
6	59	55	51	52	40	25	88	57	35	30.13	30.06	29.97	10	10	6	16	8	23	0.17		16
9	55	47	39	45	39	34	93	73	44	29.94	29.89	29.83	10	10	1	17	8	25	0		20
12	64	54	42	46	40	30	76	54	34	30.27	30.2	30.05	10	10	8	17	6	23	0		17
15	78	63	48	48	41	32	72	48	34	30.02	29.88	29.77	10	10	9	16	5	25	0.01	Thunderstorm	16
18	80	66	51	43	38	34	63	38	23	30.1	30.05	30	10	10	8	13	6	22	0		21
21	64	54	44	55	43	34	87	65	37	30.16	30.11	30	10	10	2	17	9	24	0		17
24	84	70	55	55	50	46	72	47	27	29.82	29.73	29.59	10	10	10	21	9	34	0		21
27	80	70	59	63	60	54	94	77	54	30.17	30	29.82	10	10	5	28	9	40	0.61	Thunderstorm	28
30	57	49	41	48	42	36	93	73	51	30.01	29.91	29.81	10	10	7	15	6	22	0		15
2	60	54	48	48	45	43	87	74	55	29.69	29.64	29.59	10	10	10	17	10	25	0.09		17
8	80	74	69	55	52	48	50	45	42	29.95	29.9	29.86	10	10	2	15	10	22	0		20
11	84	75	66	64	61	57	73	60	48	29.9	29.83	29.75	10	10	0	16	6	26	0		18
14	78	61	44	52	45	39	87	60	29	30.22	30.17	30.08	10	10	2	10	6	18	0		14
17	75	68	62	64	58	48	94	69	38	29.88	29.85	29.81	10	10	0	13	7	22	0.07	Thunderstorm	22
20	89	81	73	68	65	59	73	57	45	29.98	29.92	29.81	10	10	1	17	9	31	0		20
23	75	60	46	55	50	45	93	69	43	30.08	30.05	30.02	10	10	1	12	2	-	0		18
26	71	56	42	54	46	39	93	64	35	30.13	30.07	29.98	10	9	0	13	2	-	0		15
29	84	68	53	63	55	48	94	62	29	29.89	29.86	29.82	10	8	0	13	3	16	0		13
2	91	72	53	63	58	52	94	62	33	30.05	29.98	29.9	10	10	7	13	2	-	0		23
5	91	80	68	73	70	64	94	73	49	29.97	29.9	29.84	10	10	2	13	6	28	0.4	Thunderstorm	16
8	80	66	53	63	58	52	94	72	42	30.12	30.09	30.04	10	8	0	13	3	17	0		17
11	80	66	51	55	51	46	88	60	30	30.21	30.17	30.12	10	10	3	13	4	-	0		16
14	87	76	66	66	63	59	88	65	38	30.07	30.03	29.97	10	10	10	14	4	17	0		16
17	87	78	69	70	67	63	94	65	43	29.92	29.81	29.76	10	10	10	17	12	23	0.04	Thunderstorm	17
20	78	68	57	57	55	52	88	66	39	30.16	30.11	30.08	10	10	9	14	7	20	0		14
23	89	79	69	73	68	63	83	68	55	29.98	29.88	29.83	10	10	10	15	6	21	0		15
26	75	72	68	72	67	61	94	83	69	29.77	29.67	29.55	10	9	3	14	6	25	0.89	Thunderstorm	21
29	80	64	48	64	57	46	94	78	51	30.13	30.07	30.01	10	7	0	13	3	16	0		16
1	80	66	53	64	59	50	94	81	54	29.98	29.96	29.92	10	6	0	16	3	91	0		24
4	89	76	64	73	69	64	100	79	49	29.95	29.88	29.8	10	10	6	13	6	17	0		21
7	77	67	57	66	61	55	100	76	57	30	29.95	29.93	10	8	2	13	4	17	0		14
10	69	66	62	55	52	48	77	67	53	29.94	29.91	29.89	10	10	10	20	9	30	0.01		20
13	71	64	57	63	59	55	94	82	57	29.98	29.96	29.94	10	10	10	10	2	-	0		13
16	71	68	66	66	62	55	100	81	68	29.89	29.78	29.71	10	9	2	21	5	29	0.3	Thunderstorm	21
19	69	60	50	59	52	45	94	74	40	29.98	29.95	29.93	10	10	8	12	4	-	0.03	Thunderstorm	15
22	78	64	50	61	52	46	100	68	32	30.12	30.08	30.05	10	8	0	14	5	21	0		14
25	91	76	62	63	60	55	94	61	29	30.08	30.04	30.02	10	10	6	13	5	16	0		14
28	73	62	51	57	54	50	100	71	50	30.18	30.13	30.09	10	9	1	14	4	17	0		21
31	80	78	75	66	63	54	73	60	42	30.05	29.95	29.91	10	10	10	13	10	20	0		13
3	82	70	57	66	59	54	94	77	51	30	29.98	29.91	10	10	8	8	5	-	0		13
6	77	67	57	61	55	45	100	65	34	29.94	29.93	29.91	10	10	7	13	5	16	0		17
9	66	58	48	54	48	43	100	73	43	30.14	30	29.85	10	10	2	16	4	23	0		21
12	80	70	60	63	59	54	88	65	51	30.15	30.09	30.06	10	10	10	14	5	21	0		14
15	69	54	39	50	45	37	100	76	43	30.34	30.25	30.12	10	10	5	15	5	18	0		17
18	55	50	44	50	44	36	93	78	47	29.96	29.83	29.74	10	10	4	25	8	32	0.36		25
21	59	49	39	50	43	37	100	85	55	29.89	29.82	29.75	10	9	1	15	4	20	0.71	Thunderstorm	17
24	64	46	30	45	35	28	93	75	38	30.17	29.97	29.76	10	10	3	21	8	32	0		21
27	59	49	39	43	40	36	93	74	45	30.31	30.25	30.2	10	10	5	13	3	16	0		15
30	62	50	37	46	42	36	100	77	45	30.05	30.01	29.97	10	8	0	15	4	20	0		15
3	46	44	42	45	43	39	93	92	87	29.99	29.97	29.95	10	8	5	7	5	-	0		24
6	41	40	39	36	36	36	87	86	81	30.14	29.99	29.92	10	10	6	23	17	31	0.04		23
9	57	52	48	45	42	34	82	66	54	29.94	29.82	29.74	10	10	6	25	10	34	0.39		25
12	48	40	32	34	29	25	93	65	43	30.47	30.37	30.23	10	10	10	15	6	23	0		25
15	48	42	33	43	38	30	93	78	62	29.95	29.81	29.59	10	10	4	23	15	33	0.38		23
18	59	52	44	54	47	39	94	88	81	29.54	29.37	29.25	10	9	3	17	9	26	1.16		17
21	57	44	32	48	38	30	100	84	51	30.05	30	29.89	10	5	0	17	3	18	0		17
24	71	63	55	63	58	54	94	83	69	29.97	29.92	29.85	10	9	3	10	6	-	0		25
7	48	38	30	30	27	25	87	66	46	30.16	30.09	29.98	10	10	10	12	6	-	0		12
10	64	54	44	48	42	37	87	74	52	30.1	29.98	29.85	10	6	2	17	9	34	0.03		24
13	35	30	26	21	19	16	80	62	52	30.48	30.4	30.21	10	10	10	20	11	26	0		20
16	46	35	24	36	28	21	100	82	57	30.49	30.44	30.35	10	6	0	10	3	-	0		12
19	51	40	28	36	31	25	93	69	47	30.36	30.25	30.12	10	9	5	8	5	-	0		10
22	62	54	46	46	41	37	82	62	42	30.02	29.84	29.62	10	9	3	20	10	30	0		32
25	33	30	26	28	23	18	93	71	55	30	29.86	29.79	10	8	1	20	8	25	0.12		20
28	35	29	23	27	20	16	86	65	52	30.29	30.22	30.15	10	9	1	17	12	25	0		18
1	51	42	33	48	35	30	94	82	70	30.24	30.06	29.85	8	5	2	13	9	21	0.6		18
4	51	42	30	52	32	16	88	65	48	30.24	29.99	29.78	10	10	7	21	12	30	0		21
7	42	40	35	37	31	25	81	71	61	29.98	29.94	29.87	10	10	10	10	7	-	0		20
10	32	30	28	27	23	19	93	76	60	29.9	29.75	29.65	10	9	2	12	5	18	0		21
13	44	38	32	30	28	27	87	67	49	30.22	30.14	30.06	10	10	10	15	7	26	0		17
16	46	42	39	45	40	36	100	93	87	29.64	29.56	29.53	10	3	0	14	4	17	0.1		14
19	35	34	32	32	28	25	93	80	65	30.11	29.99	29.78	10	9	2	12	1	-	0		30
22	30	20	19	19	18	16	93	82	64	30.09	30.03	29.92	10	10	10	17	12	26	0		17
25	28	26	23	23	20	18	93	79	64	30.37	30.27	30.07	10	10	9	9	2	-	0		16
28	30	27	24	25	21	19	93	78	64	30.15	30.07	29.95	10	9	2	8	2	-	0		15
31	35	28	19	25	19	10	86	69	59	30.09	29.97	29.89	10	9	4	18	9	30	0		18
3	28	26	24	23	19	18	86	74	64	30.12	30.05	29.99	10	8	3	17	9	29	0		23
6	37	30	23	32	25	18	93	76	60	30.25	29.99	29.82	10	8	0	17	9	28	0.03		24
9	41	38	35	30	27	25	75	66	56	30.42	30.1	29.87	10	10	10	25	13	32	0		25
12	51	42	32	46	36	25	87	72	50	29.96	29.8	29.65	10	10	7	23	10	32	0.03		23

15	28	24	21	18	14	12	80	66	51	30.39	30.29	30.08	10	10	10	14	7	18	0		22
18	41	22	6	32	15	-2	86	70	53	30.37	30.1	29.77	10	9	1	20	9	36	0		38
21	12	6	0	7	-2	-9	79	70	61	30.13	30.05	30	9	2	0	23	16	29	0		25
24	15	10	5	10	2	-2	92	69	53	30.61	30.48	30.19	10	8	1	17	8	26	0		17
27	28	24	21	25	20	16	93	77	59	30.38	30.26	30	10	8	0	14	6	20	0.06		15
30	37	30	21	37	28	16	93	86	74	29.45	29.31	29.17	10	5	1	23	9	38	0.42		25
2	17	14	10	10	6	1	85	73	53	30.11	30.04	30	10	6	0	15	8	20	0		17
5	26	10	-5	21	8	-9	86	75	47	30	29.84	29.72	10	9	0	17	6	22	0		17
8	26	16	5	25	16	1	93	77	68	30.38	30.22	29.99	10	8	0	14	9	22	0.01		16
11	44	37	30	39	29	19	93	78	64	29.84	29.54	29.39	10	8	1	26	14	34	0.03		26
14	37	30	24	34	28	16	93	87	69	29.92	29.68	29.56	10	3	1	23	5	31	0.03		23
17	21	10	0	14	4	-6	92	76	63	30.19	30.14	30.07	10	10	2	9	3	-	0		25
20	21	18	15	16	11	7	80	72	63	30.32	30.17	29.96	10	3	1	24	17	32	0		24
23	30	28	26	27	24	19	86	82	69	29.86	29.81	29.77	10	5	1	13	6	20	0		13
26	39	29	19	27	21	14	86	72	52	30.14	29.9	29.67	10	9	2	24	10	32	0		24
1	26	24	19	16	14	10	74	66	55	30.2	30.16	30.07	10	10	10	16	9	23	0		16
4	33	20	6	19	11	1	92	69	47	30.16	30.12	30.08	10	10	10	13	4	-	0		18
7	30	27	24	25	18	14	80	67	55	30.44	30.37	30.27	10	10	10	12	6	-	0		14
10	42	38	35	39	36	32	100	89	81	29.91	29.82	29.66	10	5	0	13	6	-	0.8		18
13	30	26	23	18	14	9	80	59	40	30.22	30.08	29.89	10	8	2	22	14	31	0		22
16	28	22	17	19	15	12	86	71	51	30.06	29.96	29.85	10	8	2	14	9	18	0		21
19	33	26	19	27	15	12	86	72	55	29.89	29.7	29.52	10	5	0	25	19	34	0		25
22	30	28	26	23	19	16	75	68	59	30.06	30.01	29.97	10	10	10	12	7	-	0		16
25	35	32	28	27	22	18	75	66	56	30.03	29.88	29.79	10	10	10	16	9	21	0		16
28	41	34	26	28	22	18	87	57	45	30.31	30.3	30.29	10	10	10	12	7	-	0		14
31	42	36	30	39	33	16	100	82	52	29.82	29.71	29.65	10	5	0	22	9	29	0.2		22
3	35	25	15	18	14	10	93	57	44	30.48	30.37	30.27	10	10	10	12	4	20	0		17
6	53	40	28	43	25	16	82	57	39	30.21	29.95	29.57	10	10	1	17	7	26	0.07		25
9	41	38	35	37	36	32	93	90	81	30.09	30.04	29.96	10	6	0	14	4	22	0.64	Thunderstorm	32
12	37	34	32	34	30	28	93	85	81	29.74	29.63	29.57	10	8	1	21	11	25	0.17		21
15	57	50	42	50	42	30	93	79	61	29.92	29.81	29.74	10	10	4	17	11	25	0.21		21
18	57	49	41	54	45	36	100	90	81	30	29.63	29.35	10	7	0	15	8	21	1.1		30
21	46	32	19	27	17	12	86	54	27	30.59	30.48	30.36	10	10	10	14	5	18	0		18
24	44	38	33	28	24	14	81	58	31	30.04	29.97	29.93	10	10	10	15	8	20	0.03		23
27	66	55	44	45	38	30	71	50	31	30.25	30.2	30.09	10	10	10	17	10	24	0		17
30	78	68	57	57	54	50	88	66	42	29.92	29.84	29.8	10	10	2	21	9	33	0.31	Thunderstorm	22
3	59	49	39	54	41	36	94	81	63	30.21	30.11	30.03	10	10	6	14	7	20	0.18	Thunderstorm	16
6	71	56	41	43	37	30	87	52	24	30.1	30.06	30.01	10	10	10	17	5	22	0		17
9	75	58	42	45	41	37	87	66	31	30.03	29.98	29.94	10	10	10	15	3	21	0.12		22
12	41	34	28	28	25	21	86	62	45	30.12	30.02	29.9	10	10	10	23	17	33	0		23
15	69	60	51	50	45	43	76	54	38	29.83	29.72	29.51	10	10	8	21	10	32	0		21
18	75	63	51	48	45	39	76	58	31	30.16	30.1	30.02	10	10	10	13	8	17	0		21
21	77	68	60	63	59	55	94	75	54	29.77	29.71	29.67	10	10	7	17	7	25	0.16	Thunderstorm	20
24	51	40	30	37	32	28	93	67	50	30.43	30.37	30.29	10	10	8	16	7	23	0		16
27	69	54	39	43	38	36	93	55	31	30.25	30.13	29.98	10	10	7	16	7	21	0		16
30	84	70	55	66	62	54	94	68	51	29.95	29.91	29.85	10	9	1	22	7	33	0		22
2	59	49	39	57	41	36	94	77	58	30.05	29.89	29.63	10	8	2	23	9	29	0.19		23
5	64	56	48	48	44	39	93	65	42	30.21	30.14	30.05	10	10	8	13	5	18	0.02		16
8	68	55	42	52	46	39	93	74	56	30.07	30.01	29.94	10	10	5	9	2	-	0		15
11	73	63	53	63	58	52	94	82	65	29.93	29.87	29.84	10	7	0	10	3	-	0		21
14	68	55	42	48	45	39	93	73	43	30.16	30.1	30.05	10	10	3	16	4	20	0		21
17	69	62	55	57	54	48	94	75	63	30.01	29.93	29.88	10	10	9	14	5	16	0.04	Thunderstorm	17
20	78	61	44	55	50	43	93	68	41	30.19	30.15	30.12	10	10	0	14	5	16	0		21
23	84	73	62	70	65	59	94	76	58	30.01	29.96	29.88	10	8	0	14	5	23	0	Thunderstorm	15
26	82	68	55	70	62	54	100	80	57	29.84	29.8	29.76	10	6	0	14	3	21	0		15
29	75	66	57	61	56	52	94	73	44	29.81	29.69	29.61	10	8	1	16	5	23	0		16
2	71	58	46	54	46	39	87	62	41	30.15	30.12	30.05	10	10	10	10	5	-	0.04		13
5	84	70	55	63	58	54	94	67	40	30.09	30.06	30.03	10	8	0	16	4	18	0		16
8	71	68	64	70	65	63	94	86	78	29.99	29.95	29.9	10	7	2	13	5	25	0.85	Thunderstorm	23
11	71	60	50	59	54	48	94	74	43	30.12	30.07	30	10	8	0	17	4	22	0		17
14	82	70	57	66	61	54	94	72	51	30.27	30.25	30.2	10	10	1	10	5	-	0		15
17	89	79	69	73	71	66	94	75	55	30.28	30.23	30.16	10	9	4	13	4	-	0		24
20	73	64	53	66	56	43	94	69	38	30.01	29.89	29.79	10	8	0	15	4	20	0		15
23	75	65	53	66	53	43	83	63	52	29.97	29.82	29.66	10	10	10	24	11	32	0		24
26	75	68	62	61	56	43	94	71	43	30.01	29.94	29.85	10	10	2	16	5	31	0.09		18
29	64	58	51	54	52	48	94	81	68	30.2	30.09	29.93	10	9	1	10	6	-	0.09		14
1	73	65	57	61	56	52	94	73	50	29.95	29.93	29.9	10	9	0	13	4	18	0.01		15
4	68	58	48	55	50	45	94	72	49	30.22	30.17	30.13	10	9	0	15	4	20	0		15
7	69	64	60	66	61	57	94	81	64	30	29.85	29.73	10	10	7	14	6	22	0.3	Thunderstorm	16
10	71	58	46	54	51	45	94	72	46	30.17	30.13	30.05	10	9	1	12	3	-	0		13
13	64	58	50	48	45	41	76	61	45	30.14	30.07	29.98	10	10	10	18	8	25	0.03		18
16	78	62	46	59	51	43	93	69	36	30.21	30.17	30.13	10	10	1	12	4	-	0		13
19	80	63	46	63	53	45	94	69	42	30.11	30.08	30.03	10	7	0	14	5	22	0		21
22	78	66	53	66	60	46	94	76	34	30.14	30.06	29.95	10	10	4	12	5	17	0.05	Thunderstorm	15
25	84	70	57	66	60	52	82	64	48	30.23	30.16	30.08	10	10	8	17	6	28	0		20
28	80	72	64	70	67	63	94	81	61	30.06	29.96	29.85	10	10	1	14	5	-	0		16
31	77	68	60	64	62	57	94	78	57	29.89	29.86	29.82	10	10	0	16	5	20	0		16
3	68	60	51	54	49	45	88	64	46	30.07	30.02	29.97	10	10	10	13	7	18	0		14
6	77	59	41	57	47	37	93	65	36	30.25	30.16	30	10	10	4	13	5	16	0		15
9	80	68	57	70	59	46	94	75	59	30.05	29.92	29.79	10	10	5	10	6	-	0.13		15
12	69	61	53	64	52	39	94	69	49	30.1	30	29.94	10	9	1	20	8	26	0		20
15	60	56	53	54	50	45	88	82	72	30.22	30.07	30.01	10	10	2	16	2	24	0.3		16
18	75	60	46	57	50	43	87	72	53	30.18	30.06	29.95	10	10	8	12	6	18	0		14
21	62	58	53	55	46	39	88	67	54	29.94	29.83	29.72	10	10	8	21	10	25	0.11		21
24	66	52	39	48	42	36	93	75	46	30.15	30.09	30.01	10	9	1	10	5	-	0		14
27	77	60	42	52	46	39	93	67	36	30.22	30.17	30.13	10	10	2	10	6	-	0		17
30	69	52	35	48	43	34	93	72	43	30.02	29.96	29.88	10	9	0	12	4	17	0		21
3	68	56	46	61	44	39	83	67	55	30.06	29.99	29.94	10	10	6	9	6	-	0		15
6	66	55	44	63	53	41	94	85	59	29.78	29.7	29.66	10	8	2	16	5	22	0.22		20
9	69	58	46	52	47	41	93	71	46	30.27	30.22	30.18	10	10	1	12	5	17	0		12
12	75	60	46	57	49	39	88	71	50	30.09	30.01	29.95	10	10	5	20	8	28	0.33	Thunderstorm	21
15	41	40	39	36	36	36	87	86	81	30.24	30.22	30.18	10	10	10	7	6	-	0		12
18	55	44	33	45	38	30	93	78	58	29.85	29.81	29.78	10	9	5	17	6	23	0.08		17
21	53	45	37	45	31	18	87	60	42	29.85	29.78	29.68	10	10	10	23	14	32	0		25
24	44	38	33	34	30	27	93	70	53	30.17	30.03	29.9	10	10	5	20	8	25	0.02		24
27	48	40	32	34	29	25	93	59	49	30	29.95	29.89	10	10	10	18	8	25	0		18
30	59	46	33	52	40	30	100	78	59	30.2	30.07	29.82	10	9	7	9	5	-	0.02		28
2	44	40	35	41	35	30	93	78	57	30.14	29.89	29.67	10	10	10	12	5	16	0.01		17
5	55	52	48	48	45	37	94	79	62	30.28	30.18	29.99	10	10	5	12	5	18	0		20
8	41	39	37	28	25	21	70	59	49	30.25	30.16	30.02	10	10	10	14	10	21	0		29
11	41	36	28	36	25	12	93	72	47	30.4	30.17	30.02	10	9	1	20	12	28	0.19		20
14	44	42	39	34	28	21	66	58	49	30.03	29.93	29.87	10	10	10	17	11	25	0		17
17	64	54	44	61	53	36	100	91	71	29.56	29.35	29.03	10	9	3	34	15	44	1.21	Thunderstorm	34
20	44	37	30	25	22	18	69	54	34	30.32	30.25	30.17	10	10	10	15	7	23	0		20
23	30	24	17	19	11	3	86	61	49	30.57	30.44	30.28	10	8	1	23	17	31	0		23
26	37	30	23	30	23	12	93	72	59	30.09	29.98	29.94	10	8	1	17	11	24	0.01		17
29	30	22	15	25	20	12	100	83	64	30.58	30.51	30.41	10	10	3	8	5	-	0.02		13
2	39	32	26	28	27	23	100	82	52	29.99	29.92	29.87	10	8	0	7	1	-	0		16
5	50	36	21	46	22	10	87	68	59	30.15	29.84	29.46	10	10	7	23	16	33	0.01		23
8	21	18	15	18	10	5	93	72	54	30.55	30.34	29.96	10	8	1	13	7	-	0		25
11	15	12	10	9	5	1	85	71	62	30.39	30.28	30.13	10	7	1	22	16	26	0		24
14	19	14	10	16	11	3	93	82	67	30.3	30.11	29.9	10	7	1	16	11	22	0		23
17	30	24	17	21	18	12	93	84	64	29.93	29.86	29.79	10	7	0	18	7	25	0.03		18
20	26	24	23	23	20	18	93	81	74	29.93	29.86	29.8	10	8	2	16	10	22	0.01		16
23	24	18	12	18	14	9	100	83	68	30.3	30.19	30.02	10	9	2	9	3	-	0.05		14
26	24	22	21	21	16	10	93	79	63	30.19	30.11	29.98	10	8	2	18	6	24	0.03		18
29	39	26	14	34	19	5	93	78	63	30.08	29.87	29.7	10	7	2	20	10	31	0		22
1	14	10	6	3	1	-4	79	68	57	30.39	30.35	30.31	10	10	9	12	5	16	0		16
4	32	26	19	28	22	10	93	79	68	30.01	29.8	29.68	10	7	0	24	12	33	0.03		25
7	8	3	-2	3	-2	-9	85	78	71	30.2	30.05	29.96	5	2	0	25	17	31	0		25
10	39	27	17	37	26	14	100	91	80	30.18	29.91	29.51	10	5	2	9	6	16	0.26		21
13	41	37	33	36	31	23	93	76	65	29.66	29.54	29.47	10	10	10	15	9	21	0		21
16	26	22	19	25	20	14	93	84	74	29.76	29.54	29.46	10	5	1	14	9	23	0.02		15
19	30	26	21	25	22	14	93	80	68	29.73	29.53	29.45	10	8	1	26	12	34	0		26
22	14	11	8	10	5	1	86	80	67	30.13	29.93	29.8	10	4	0	13	7	18	0		25
25	28	18	8	25	6	-6	93	67	52	29.71	29.49	29.24	9	4	0	24	18	33	0.01		26
28	8	4	1	1	-1	-4	85	76	67	30.22	30.14	30.01	7	2	0	22	15	30	0		25
31	24	16	6	21	10	3	92	75	68	30.11	30.03	29.78	10	10	4	17	10	24	0		17
3	19	10	0	12	3	-8	93	78	58	30.33	30.29	30.23	10	10	10	12	2	-	0		14

6	15	12	8	9	5	1	85	76	62	30.34	30.24	30.18	10	6	1	20	6	26	0		20
9	21	14	10	16	10	7	93	80	63	30.15	30.08	30.03	10	4	0	13	2	17	0.05		13
12	21	16	10	18	11	5	86	78	67	30.32	30.16	30.03	10	9	2	15	7	20	0		18
15	19	12	6	10	6	1	92	75	58	30.05	29.98	29.89	10	8	2	10	4	-	0		17
18	39	26	12	28	18	9	93	72	45	29.87	29.73	29.59	10	10	3	17	4	25	0		28
21	37	32	24	36	20	12	87	70	55	29.6	29.33	29.15	10	7	0	30	19	45	0.02		30
24	19	16	14	9	6	1	73	64	53	30.15	30.1	30.03	10	9	2	23	16	31	0		24
27	14	7	0	7	-4	-11	85	66	47	30.17	29.9	29.47	10	4	0	29	16	38	0		29
2	8	-2	-13	3	-9	-27	84	58	40	30.38	30.35	30.3	10	10	5	13	8	18	0		15
5	23	9	-5	7	-1	-11	100	68	39	30.51	30.44	30.29	10	10	0	13	3	16	0		14
8	28	18	6	27	15	1	92	77	59	30.21	30.15	29.99	10	9	1	15	9	20	0		18
11	42	38	32	30	27	19	81	66	53	29.86	29.71	29.6	10	10	10	14	4	20	0		17
14	44	36	28	34	29	23	93	72	49	29.78	29.56	29.44	10	9	5	21	8	29	0.01		21
17	32	18	5	9	0	-4	78	48	23	30.21	30	29.86	10	10	10	13	7	20	0		14
20	33	28	24	28	23	19	93	74	56	30.04	29.94	29.81	10	9	2	18	12	26	0.01		18
23	19	14	8	10	6	1	86	66	49	30.41	30.37	30.32	10	8	1	13	6	18	0		17
26	28	12	-4	16	4	-9	100	66	43	30.28	30.19	30.04	10	10	7	15	4	21	0		20
29	37	32	24	25	22	19	86	70	48	30.28	30.24	30.19	10	10	10	15	7	20	0		16
1	51	40	30	41	29	19	86	72	47	30.03	29.78	29.62	10	8	1	22	12	30	0.14		22
4	37	32	28	36	29	21	93	81	52	29.83	29.57	29.38	10	6	1	24	11	34	0.16	Thunderstorm	24
7	53	42	30	30	28	25	81	60	35	29.97	29.79	29.6	10	10	3	12	5	-	0		15
10	57	49	41	41	29	21	81	45	27	29.9	29.7	29.6	10	10	8	16	10	29	0.01		17
13	51	45	39	50	43	36	100	90	81	29.78	29.71	29.55	10	8	1	16	6	22	1.22	Thunderstorm	24
16	42	33	24	23	18	16	80	55	36	30.37	30.28	30.21	10	10	10	16	5	23	0		17
19	57	42	26	30	26	21	93	60	26	30.47	30.37	30.26	10	10	10	14	7	20	0		15
22	44	40	35	43	29	25	93	66	53	30.07	29.93	29.78	10	10	1	20	12	28	0		20
25	55	47	39	39	36	28	93	74	50	29.82	29.75	29.7	10	9	5	15	7	23	0.22		23
28	55	50	44	30	26	23	46	40	33	30.02	29.89	29.75	10	10	10	30	21	40	0		30
1	48	44	39	39	36	34	87	74	58	29.75	29.69	29.66	10	10	5	16	7	22	0		18
4	50	42	33	37	32	30	100	70	47	30.12	29.98	29.81	10	10	10	18	6	25	0		18
7	59	50	42	46	38	27	87	68	46	30.07	29.98	29.89	10	10	7	22	13	28	0.36	Thunderstorm	22
10	62	54	46	41	37	34	76	54	34	29.98	29.89	29.77	10	10	10	18	12	24	0		18
13	68	58	48	63	51	43	94	82	71	30.09	29.91	29.7	10	9	0	13	6	21	0.11		20
16	46	40	33	34	29	27	87	69	46	30.07	30.03	30	10	10	10	12	8	-	0		17
19	68	55	42	46	39	36	82	54	33	30.24	30.17	30.08	10	10	5	15	4	21	0.32		16
22	60	53	46	46	44	39	93	75	59	30.14	30.07	29.95	10	10	5	15	5	21	0		17
25	75	58	41	45	41	36	93	56	24	30.18	30.12	30.03	10	10	9	15	4	22	0		15
28	73	60	48	52	47	39	82	58	45	30.1	30.03	29.97	10	10	10	15	5	20	0		15
31	80	65	50	55	51	46	94	64	39	30.24	30.19	30.11	10	10	7	14	4	17	0		20
3	69	62	55	61	51	46	78	63	46	29.92	29.82	29.7	10	10	9	20	10	30	0		20
6	73	58	42	50	46	39	93	64	38	30.02	29.99	29.96	10	10	5	15	3	18	0		15
9	73	58	42	48	44	37	93	64	33	30.09	30.04	29.99	10	10	4	15	2	22	0		15
12	71	62	53	61	56	45	100	82	55	29.78	29.74	29.71	10	8	0	15	4	21	0		16
15	80	66	53	63	51	46	77	57	34	30.06	29.95	29.83	10	10	10	20	8	31	0		25
18	71	64	57	64	62	55	100	89	78	30.07	29.99	29.88	10	9	4	14	6	22	0.94		16
21	71	64	57	61	57	54	94	84	68	30.02	29.98	29.92	10	9	1	15	3	16	0		15
24	69	63	57	63	58	55	94	89	78	29.92	29.88	29.85	10	5	0	10	3	-	0		10
27	80	68	55	66	61	54	94	75	54	30.1	30.06	30.02	10	9	0	13	4	-	0		17
30	80	72	64	70	66	61	94	78	61	29.89	29.77	29.56	10	10	7	16	6	37	0.25	Thunderstorm	17
3	68	57	46	52	47	37	94	69	33	30.19	30.09	30.02	10	10	2	16	4	-	0		18
6	75	66	57	66	60	52	88	76	68	30.02	29.84	29.63	10	9	2	14	5	22	0.02	Thunderstorm	17
9	66	58	51	52	50	48	88	74	52	30.07	29.94	29.81	10	10	5	10	4	-	0		13
12	77	70	62	68	61	54	88	75	64	30.13	30.01	29.84	10	9	2	10	2	16	1.13	Thunderstorm	14
15	60	56	53	54	51	46	94	82	63	29.94	29.85	29.77	10	10	7	18	7	25	0.02		18
18	75	60	46	57	51	45	93	70	41	30.22	30.17	30.13	10	10	6	13	4	16	0		14
21	80	68	55	63	58	54	94	67	48	30.1	30.07	30.03	10	10	3	15	4	20	0		18
24	69	56	42	52	45	39	94	67	38	30.21	30.14	30.04	10	9	0	13	4	-	0		15
27	75	67	59	66	60	52	100	83	61	29.88	29.73	29.66	10	7	0	18	5	26	0.29	Thunderstorm	18
30	66	58	50	57	51	46	94	76	52	30.04	30.01	29.98	10	9	0	14	3	-	0		15
2	75	65	55	64	58	54	94	81	64	30.16	30.13	30.09	10	7	0	13	3	-	0		14
5	68	66	64	52	52	52	64	61	56	30.07	30.06	30.06	10	10	10	10	9	-	0		14
10	78	66	55	61	56	52	94	71	44	30.14	30.09	30.02	10	8	0	12	4	-	0		18
13	69	56	44	57	48	41	93	70	40	30.05	29.98	29.92	10	8	0	12	3	-	0		15
16	69	60	51	64	58	46	88	85	73	29.96	29.88	29.84	10	9	5	16	7	25	0.03		16
19	73	68	64	64	63	61	94	84	69	29.76	29.71	29.69	10	9	4	12	4	-	0.07		12
22	80	73	66	70	66	63	94	85	65	30.03	29.98	29.92	10	9	2	8	3	-	0		14
25	80	74	68	72	67	63	89	83	74	30.08	30.01	29.97	10	9	5	17	6	24	0.04	Thunderstorm	17
28	71	56	42	54	49	39	93	72	46	30.2	30.16	30.09	10	9	0	12	4	-	0		16
31	75	68	62	63	61	59	94	83	65	29.97	29.93	29.85	10	10	6	7	3	-	0		18
3	78	66	53	64	55	52	94	72	42	30.02	29.98	29.93	10	8	0	14	4	18	0		20
6	69	61	53	57	52	45	94	68	43	30.15	30.1	30.04	10	10	5	14	5	18	0		14
9	80	66	53	63	55	50	94	72	44	30.03	29.98	29.91	10	10	7	10	4	-	0		23
12	53	48	44	43	41	39	87	75	58	30.36	30.3	30.25	10	10	10	10	5	-	0.09		16
15	57	50	42	52	48	39	94	81	72	30.15	30.12	30.1	10	8	0	10	3	-	0.05		14
18	60	53	44	48	45	43	93	73	59	30.2	30.15	30.05	10	10	10	9	5	-	0		17
21	64	56	48	61	48	36	94	81	62	30.12	29.82	29.58	10	9	2	29	9	43	0.11	Thunderstorm	29
24	71	58	44	54	49	41	94	78	49	30.41	30.35	30.32	10	9	1	10	4	-	0		10
14	60	56	53	57	52	50	94	91	88	29.65	29.61	29.52	10	8	2	16	6	26	1.58		16
17	53	48	44	50	46	37	94	86	71	29.77	29.56	29.45	10	7	1	20	6	29	0.12		20
20	51	46	42	46	42	39	93	80	71	29.99	29.85	29.76	10	9	0	14	5	20	0		17
23	30	28	26	27	25	25	93	88	86	30.29	30.26	30.22	10	8	3	6	5	-	0		20
26	53	43	33	36	32	28	87	57	41	29.98	29.93	29.87	10	10	10	17	9	24	0		23
29	48	44	39	37	34	28	93	69	53	30.1	29.96	29.81	10	10	7	24	14	30	0.01		24
2	50	34	19	34	26	16	93	64	37	30.39	30.29	30.17	10	10	10	15	5	20	0		15
5	44	42	39	36	33	28	87	76	53	30.07	30	29.91	10	10	7	9	7	-	0.01		21
8	41	38	35	37	30	18	93	73	45	29.87	29.76	29.62	10	8	3	22	10	30	0.15		22
11	48	39	30	45	35	19	87	78	60	29.95	29.67	29.53	10	9	2	25	8	31	0.15		25
14	30	28	26	21	18	12	74	63	51	30.3	30.24	30.16	10	10	4	16	11	21	0		16
17	30	24	17	19	12	7	86	67	54	29.79	29.7	29.65	10	6	1	26	13	36	0.04		30
20	24	22	19	12	8	3	68	59	49	30.17	29.92	29.77	10	7	1	28	21	37	0		28
23	48	44	41	45	44	37	93	90	82	29.82	29.62	29.18	10	5	1	10	5	17	0.48		21
26	30	27	24	27	23	19	93	83	74	30.18	30.16	30.14	10	10	7	6	2	-	0		16
29	46	36	26	43	29	19	87	79	70	29.94	29.69	29.55	10	10	8	12	8	20	0		22
2	33	19	6	28	13	1	87	71	59	30.61	30.26	29.95	10	10	2	17	6	24	0		24
5	35	30	24	28	21	10	81	66	54	30.3	30.24	30.17	10	10	9	7	4	-	0		16
8	33	32	30	28	21	12	81	64	44	30.28	30.17	30.05	10	10	5	10	8	17	0.02		14
13	41	38	35	39	35	30	93	88	81	30.17	30.08	30.02	5	3	0	15	8	21	0		15
16	42	36	30	41	36	27	93	88	81	29.95	29.76	29.68	10	4	1	20	7	25	0.02		22
19	30	19	8	21	15	3	93	78	64	30.31	30.28	30.24	10	10	10	7	4	-	0		12
22	37	34	30	30	25	21	87	72	56	30.06	29.94	29.78	10	8	5	15	8	22	0.06		17
25	39	35	33	30	28	27	87	74	65	30	29.79	29.47	10	10	10	21	13	31	0.01		21
28	33	30	26	28	18	10	75	65	51	30.24	30.11	30	10	10	10	18	13	23	0		18
31	21	19	17	9	7	5	68	56	50	30.09	30	29.95	10	10	10	23	17	33	0		23
3	32	24	15	28	22	9	93	85	73	30.23	29.97	29.77	10	6	0	9	5	-	0.01		24
6	17	12	6	9	3	-4	85	67	52	30.3	30.15	30.05	10	7	2	29	10	37	0		29
9	15	10	6	10	1	-2	79	68	57	30.22	30.01	29.67	9	2	0	26	20	33	0		26
12	24	17	8	18	9	0	80	67	57	30.75	30.47	30.23	10	8	2	15	9	26	0		15
15	35	29	23	27	23	18	80	73	60	30.11	29.9	29.8	10	9	2	22	10	28	0		22
20	30	21	14	18	14	10	86	73	55	30.06	30	29.93	10	9	1	12	5	20	0		13
23	33	32	30	28	24	21	93	77	69	30.26	30	29.73	10	8	2	21	12	28	0.02		21
26	24	12	1	9	3	-4	85	67	40	30.04	29.97	29.89	10	10	10	8	4	-	0		12
29	33	28	23	28	19	9	93	71	40	30.26	29.92	29.75	10	8	1	20	9	33	0.06		20
1	19	14	8	9	4	0	79	65	58	30.27	30.14	30	10	7	2	18	12	28	0		18
4	21	16	10	18	9	-4	93	68	46	30.29	30.09	29.96	10	7	2	18	6	26	0.01		24
7	35	30	26	28	23	19	80	73	69	29.98	29.81	29.65	10	9	6	10	4	-	0		16
10	33	17	1	18	7	-4	85	67	38	30.3	30.21	30.04	10	10	10	10	3	17	0		18
13	21	13	5	16	8	1	92	74	58	30.35	30.06	29.79	10	7	0	24	7	30	0		30
16	17	8	-2	3	-10	-15	73	46	30	30.44	30.18	29.93	10	10	1	10	6	-	0		17
19	1	-2	-4	-2	-8	-13	85	70	55	30.31	30.22	30.11	10	3	0	14	8	23	0		15
22	15	8	1	10	2	-6	92	70	56	30.58	30.36	30.12	10	5	0	18	8	23	0		28
25	12	10	5	7	0	-4	73	64	53	30.14	29.98	29.76	10	8	1	18	11	24	0		18
28	21	5	-11	9	-1	-17	85	66	46	30.66	30.59	30.47	10	10	10	14	5	20	0		25
3	30	22	15	25	18	9	86	75	64	30.27	29.83	29.53	10	7	1	22	8	28	0.01		23
6	28	12	-5	19	7	-9	85	69	50	30.42	30.22	30.05	10	10	7	22	7	32	0		22
9	48	32	17	34	24	12	93	70	46	30.13	30.08	30.05	10	9	1	16	4	28	0		16
12	50	38	26	21	16	9	80	44	22	30.55	30.48	30.37	10	10	10	13	5	20	0		13
15	48	36	24	32	27	19	87	66	50	30.24	30.11	29.91	10	10	2	12	4	21	0		21
18	39	29	19	23	17	12	80	57	38	30.29	30.26	30.22	10	10	10	16	5	21	0		16
21	41	32	21	36	21	9	87	61	40	30.28	30.1	29.9	10	10	5	18	9	23	0		18
24	41	34	26	19	15	9	74	50	29	30.36	30.23	30.11	10	10	10	13	5	-	0		18
27	21	16	12	12	4	0	68	52	42	30.23	30.15	30.08	10	10	3	18	11	28	0		25
30	46	40	35	30	28	25	81	63	43	29.96	29.87	29.74	10	10	10	22	14	29	0		22
2	62	53	44	46	39	32	93	62	34	29.78	29.69	29.6	10	9	2	18	11	36	0.32		18

5	42	35	28	34	28	19	93	74	52	30.12	30.09	30.07	10	9	2	13	4	-	0.03		20
8	44	40	35	36	32	25	93	76	49	30.14	30.05	29.99	10	9	3	21	12	29	0.21		25
11	55	42	28	36	28	23	93	64	31	30.22	30.15	30.06	10	10	0	12	3	-	0		18
14	59	44	28	34	26	14	93	53	18	30.29	30.23	30.11	10	10	8	13	3	-	0		14
17	66	48	30	46	37	28	93	73	46	30.1	30.05	30	10	8	0	10	2	-	0		21
20	48	42	37	46	39	32	93	86	75	29.48	29.28	29.1	10	7	1	15	9	24	0.34		22
23	42	36	28	27	21	16	86	59	39	30.04	29.96	29.84	10	10	9	17	11	25	0		17
26	50	39	28	30	26	19	80	54	43	30.05	30.01	29.92	10	10	10	18	5	23	0		18
29	53	42	30	39	32	27	87	66	41	30	29.95	29.91	10	10	5	17	5	22	0		20
2	71	54	37	43	36	34	87	52	25	30.08	30.01	29.93	10	10	10	18	5	21	0		18
5	66	55	44	37	32	19	71	50	17	30.34	30.28	30.24	10	10	10	13	6	16	0		21
8	78	71	57	61	57	50	78	62	50	30.02	29.93	29.89	10	10	10	17	7	24	0		17
11	64	56	48	61	51	39	93	81	62	30.03	29.84	29.7	10	10	7	20	10	28	0.17		20
14	64	48	33	43	35	28	87	62	34	30.43	30.33	30.13	10	10	4	10	4	18	0		13
17	80	70	60	64	62	57	94	75	57	30.04	29.96	29.84	10	9	3	15	7	30	0		24
20	51	38	26	34	28	21	93	64	40	30.26	30.2	30.08	10	9	0	13	3	-	0		20
23	73	52	30	39	32	27	87	50	22	30.36	30.3	30.21	10	10	10	17	4	25	0		20
26	73	68	62	66	60	55	94	78	68	29.95	29.86	29.73	10	9	2	14	6	21	0.83		17
29	78	66	55	66	59	52	94	77	61	30.11	30	29.88	10	9	2	13	6	25	0.49	Thunderstorm	17
1	60	48	35	43	37	30	87	63	39	30.34	30.27	30.2	10	10	6	16	6	21	0		16
4	73	62	50	61	53	45	94	73	60	30.02	30	29.97	10	10	6	16	6	23	0		16
7	73	62	51	64	56	41	94	76	58	29.99	29.75	29.61	10	9	2	16	7	24	0.63		20
10	73	65	57	57	55	52	82	67	50	29.86	29.69	29.55	10	10	6	14	7	18	0		16
13	66	58	51	61	54	48	94	84	73	30.03	29.99	29.93	10	8	3	12	4	16	0.07		12
16	66	57	48	55	48	43	94	69	45	30.18	30.11	29.97	10	10	1	14	7	20	0		14
19	68	54	41	46	42	36	82	61	37	30.18	30.11	30.01	10	10	10	15	4	22	0		15
22	73	63	53	64	59	52	94	83	69	29.97	29.82	29.65	10	7	0	21	5	31	0.25	Thunderstorm	25
25	77	65	53	57	54	50	88	66	47	30.08	30.01	29.97	10	10	2	16	6	21	0		16
28	73	58	44	54	48	39	88	66	41	29.95	29.9	29.85	10	9	0	15	3	-	0		16
1	59	54	48	48	46	45	87	79	67	30.03	29.96	29.9	10	10	10	12	7	20	0		14
4	73	62	51	61	55	46	88	68	57	30.04	29.97	29.92	10	9	1	9	3	-	0		16
7	62	56	48	50	47	45	88	70	55	30.11	29.98	29.8	10	9	3	23	10	30	0.75		23
10	75	60	46	57	50	43	88	71	47	30.13	30.1	30.06	10	8	0	13	4	-	0		14
13	78	72	66	66	63	61	88	77	57	29.9	29.71	29.53	10	9	1	14	5	20	1.42	Thunderstorm	18
16	77	62	48	59	52	46	93	70	50	30.08	30	29.88	10	10	9	10	4	17	0.01		22
19	75	70	64	64	62	55	94	81	50	29.89	29.83	29.78	10	9	0	14	5	17	0		17
22	75	60	46	57	49	43	94	65	36	30	29.96	29.92	10	9	0	8	2	-	0		15
25	82	72	62	66	61	57	88	71	48	29.96	29.91	29.86	10	10	3	14	4	18	0		14
28	87	72	57	64	60	54	88	65	40	30.05	30	29.92	10	10	5	12	4	-	0		20
31	78	68	57	61	57	54	88	68	42	29.94	29.9	29.87	10	9	0	18	7	29	0.03		34
3	73	63	53	61	53	48	94	72	43	29.86	29.78	29.67	10	7	0	10	3	-	0		14
6	75	63	51	57	53	46	82	66	50	30.05	30.01	29.95	10	10	9	10	5	-	0		13
9	75	68	60	66	61	55	94	81	69	30.02	29.98	29.93	10	9	2	12	5	-	0		17
12	71	60	48	57	52	45	88	70	46	30.19	30.13	30.04	10	10	4	14	3	17	0		15
15	82	71	60	68	63	57	94	77	54	30.13	30.1	30.07	10	8	0	12	3	-	0		17
18	75	70	66	66	64	63	88	85	73	29.97	29.87	29.74	10	8	4	8	3	-	0.09	Thunderstorm	23
21	77	62	48	55	51	45	87	59	38	30.1	30.05	29.95	10	10	9	18	9	23	0		22
24	64	60	55	52	47	43	68	61	52	29.89	29.82	29.79	10	10	8	23	15	32	0.01		23
27	69	58	46	55	51	43	88	75	56	30.21	30.17	30.14	10	9	0	15	4	20	0		15
30	71	63	55	61	58	52	94	82	69	30.09	30.05	30.01	10	7	0	9	1	-	0		13
2	82	74	66	72	68	63	94	80	66	30.02	29.98	29.95	10	6	0	9	3	-	0		13
5	78	71	64	68	64	61	94	83	69	30.13	30.09	30.06	10	4	0	10	2	-	0		17
8	73	68	62	66	65	59	94	87	78	29.97	29.85	29.73	10	6	0	16	3	22	0.42	Thunderstorm	16
11	62	56	51	54	47	39	88	69	52	30.06	30.01	29.92	10	10	7	18	6	25	0.12		18
14	77	60	44	55	49	39	87	66	47	30.06	30	29.96	10	10	10	16	4	23	0		20
17	82	70	59	63	58	52	82	64	51	30.09	29.98	29.85	10	10	10	17	6	23	0		20
20	69	56	42	54	46	37	93	74	46	30.21	30.17	30.1	10	9	0	14	4	16	0		14
23	75	62	50	55	50	45	88	69	44	30.33	30.29	30.24	10	10	10	12	4	-	0		12
26	77	65	53	57	54	48	88	73	50	30.37	30.3	30.22	10	10	10	10	6	-	0		16
29	64	56	48	61	49	37	94	72	51	30.22	30.08	29.96	10	10	5	15	5	22	0.47		17
2	62	52	41	37	33	28	76	53	32	30.5	30.46	30.41	10	10	3	20	11	25	0		20
5	59	55	51	50	48	46	82	77	72	30.25	30.21	30.16	10	10	10	10	4	-	0		16
8	59	48	37	55	44	34	94	85	72	30.16	29.98	29.83	10	8	2	9	5	-	0.4		16
11	71	61	51	54	49	45	76	62	53	29.86	29.7	29.59	10	10	10	15	8	23	0		25
14	53	48	42	43	38	36	82	69	51	29.96	29.9	29.81	10	10	10	17	7	21	0		28
17	44	37	30	28	23	19	86	54	42	30.38	30.34	30.28	10	10	8	17	7	28	0		21
20	62	58	53	48	45	43	77	60	52	30.12	30.03	29.95	10	10	10	9	5	-	0.01		20
23	53	42	30	43	34	25	93	71	51	30.37	30.22	29.97	10	10	1	13	5	21	0.08		21
26	53	42	30	39	34	27	93	75	58	30.47	30.42	30.37	10	10	2	7	5	-	0		21
29	46	42	37	37	34	28	87	70	61	29.88	29.5	29.29	10	9	3	23	15	36	0.08		23
1	53	47	41	45	40	36	87	70	58	29.97	29.76	29.57	10	10	7	18	12	29	0.03		18
4	68	56	44	54	47	37	82	71	56	30.12	30.08	30.03	10	10	10	16	5	18	0		25
7	46	40	32	36	29	21	70	57	43	30.35	30.19	30.07	10	10	10	22	14	31	0		22
10	51	38	24	39	29	19	93	78	54	30.16	30.08	29.97	10	7	0	8	4	-	0		30
13	41	38	35	32	29	25	81	71	53	30.12	29.84	29.62	10	10	5	31	24	41	0.03		31
16	62	47	32	39	33	27	87	59	34	30.18	30.15	30.12	10	10	2	9	5	-	0		22
19	50	44	37	39	27	14	81	55	38	29.91	29.71	29.55	10	10	3	29	16	38	0.06		29
22	32	28	26	25	15	9	86	61	43	30.11	30.05	29.98	10	9	0	18	9	23	0.11		18
25	53	38	24	36	29	21	86	61	41	30.31	30.21	30.14	10	10	6	17	9	26	0		20
28	33	26	19	23	18	14	86	74	60	30.48	30.41	30.34	10	10	10	9	3	-	0		20
1	41	37	33	37	31	27	93	78	61	30	29.82	29.73	10	8	2	18	10	28	0.27		18
4	46	37	28	34	30	23	93	73	57	30.53	30.42	30.25	10	8	0	10	7	20	0		12
7	37	36	35	34	31	28	93	82	75	30.24	30.17	30	10	7	5	8	3	-	0		16
10	57	47	39	39	37	34	87	69	51	29.7	29.48	29.3	10	9	3	23	9	36	0.08		23
13	57	50	44	55	48	39	94	88	81	30.03	29.82	29.58	10	8	2	14	8	20	0.72	Thunderstorm	20
16	48	42	37	41	34	27	87	76	61	29.93	29.69	29.48	10	10	5	20	10	33	0.1		23
19	28	24	21	16	12	9	74	59	50	30.31	30.17	29.98	10	10	10	22	15	30	0		22
22	41	39	37	37	34	32	93	85	81	29.87	29.8	29.73	10	7	0	9	4	-	0.01		33
25	37	34	30	28	26	25	81	74	65	30.45	30.27	30.05	10	10	10	13	4	-	0		17
28	26	24	21	21	14	9	80	63	50	30.48	30.2	29.68	10	7	1	26	14	39	0.36		26
31	30	28	26	23	18	12	75	66	51	30.17	30.12	30.06	10	10	10	18	10	29	0		28
3	33	30	28	25	19	14	75	63	55	30.17	30.04	29.8	10	9	1	17	13	32	0		20
6	39	32	24	27	23	16	80	69	56	30.3	30.23	30.17	10	10	10	13	6	18	0		13
9	39	34	28	36	31	25	93	87	80	29.82	29.77	29.68	10	4	0	13	4	18	0.04		23
12	21	16	12	14	8	1	85	70	53	30.02	29.74	29.53	10	4	0	25	11	33	0		25
15	39	32	24	36	29	21	87	84	74	29.57	29.42	29.33	10	6	2	17	9	26	0		23
18	15	12	10	9	4	1	79	67	57	30.19	30.08	30	10	6	1	21	15	30	0		21
21	26	17	8	21	15	3	86	80	74	30.32	30.28	30.24	10	9	1	5	3	-	0		10
24	30	28	26	21	21	18	80	74	64	29.98	29.93	29.89	10	8	5	14	7	21	0		18
27	35	30	26	27	19	14	93	66	55	30.13	29.99	29.64	10	10	2	21	8	30	0		21
30	41	32	26	32	28	16	81	72	64	29.67	29.6	29.53	10	10	9	15	8	20	0		15
2	35	28	21	30	25	18	93	85	75	30.2	29.99	29.53	10	8	0	21	8	28	0.16		21
5	28	24	21	21	17	14	86	73	55	30.32	30.28	30.22	10	10	2	13	3	-	0		17
8	37	32	26	30	26	19	93	78	65	29.68	29.61	29.58	10	10	9	14	4	23	0		23
11	21	18	15	9	4	1	68	56	46	30.22	30.17	30.07	10	8	2	18	12	24	0		23
14	21	16	8	3	0	-2	73	55	39	30.44	30.29	30.09	10	10	10	16	5	22	0		16
17	28	16	3	23	10	-2	85	60	50	30.37	30.19	29.91	10	10	0	13	8	17	0		25
20	44	40	37	34	31	30	87	68	57	30	29.76	29.62	10	10	9	20	11	26	0		20
23	39	32	24	27	24	19	80	71	60	30.18	30.13	30.07	10	10	10	8	4	-	0		23
26	32	29	26	18	15	12	69	56	44	30.19	30.11	30	10	10	7	17	11	28	0		17
29	37	27	17	27	15	3	75	61	43	30.12	29.85	29.63	10	10	10	26	12	36	0		26
3	33	16	1	10	5	-4	85	60	34	30.18	30.14	30.09	10	10	9	9	5	-	0		12
6	46	34	21	36	26	18	93	74	61	30.24	30.07	29.84	10	9	0	18	5	31	0		18
9	62	53	42	54	47	37	94	80	68	30	29.86	29.76	10	8	2	20	9	28	0.28		20
12	59	42	26	43	34	23	93	72	44	30.24	30.13	30.05	10	10	8	16	5	21	0		18
15	60	46	33	43	36	28	93	73	45	29.85	29.77	29.62	10	6	0	20	5	31	0		32
18	39	34	30	34	26	18	93	72	52	30.17	30.04	29.91	10	10	10	13	3	17	0		18
21	39	31	23	25	20	16	80	58	42	30.13	30.09	30	10	10	10	16	5	20	0		22
24	33	30	26	28	24	21	87	81	74	29.99	29.72	29.51	10	4	0	20	14	32	0.44		20
27	53	42	32	39	33	27	93	75	54	30.14	29.96	29.77	10	8	1	9	5	-	0.15		20
30	55	44	33	43	32	25	82	61	36	30.14	29.86	29.55	10	10	5	16	6	25	0.12	Thunderstorm	21
2	32	28	24	27	20	9	86	69	47	29.93	29.65	29.49	10	8	0	20	5	31	0.08		20
5	37	26	15	25	15	9	86	59	41	30.48	30.35	30.04	10	10	4	15	3	24	0.01		23
8	37	30	23	23	17	9	80	58	38	29.96	29.8	29.75	10	10	2	17	7	26	0		17
11	42	40	37	39	27	19	93	62	42	30.05	29.83	29.66	10	9	1	22	9	26	0		22
14	59	46	32	30	28	23	81	54	33	30.36	30.3	30.25	10	10	10	13	6	18	0		14
17	73	55	37	39	36	30	81	50	25	30.46	30.39	30.35	10	10	7	13	6	-	0		18
20	69	56	44	34	29	23	57	37	26	30.28	30.15	29.98	10	10	10	16	8	22	0		18
23	51	40	30	36	31	25	87	68	50	30.25	30.19	30.11	10	10	10	14	3	20	0		21
26	46	40	33	39	35	28	87	74	61	30.02	29.89	29.68	10	10	3	14	8	20	0.07		16
29	53	45	37	34	30	25	81	56	41	30.15	30.11	30.05	10	10	10	14	4	17	0		17
2	57	44	32	37	33	27	87	60	38	30.09	30.05	29.99	10	10	5	16	5	20	0		22
5	53	45	37	39	34	30	87	68	50	30.01	29.96	29.9	10	10	10	16	7	20	0		18
8	60	45	30	36	31	25	87	56	34	30	29.92	29.87	10	10	10	15	3	18	0		23
11	69	61	53	52	41	30	67	53	36	30.12	30.07	30.03	10	10	8	14	9	20	0		16
14	44	38	33	39	31	27	87	72	57	30	29.89	29.79	10	10	3	20	9	28	0.08		20
17	57	47	37	37	33	28	87	59	33	30.28	30.23	30.17	10	10	10	17	6	25	0		17

	20	68	50	33	39	33	27	87	53	23	30.25	30.19	30.12	10	10	4	13	3	-	0		16
	23	75	57	39	45	37	30	87	49	22	30.07	30	29.93	10	10	3	17	6	23	0		22
	26	82	72	62	64	61	55	88	72	48	29.95	29.88	29.82	10	10	5	18	6	28	0.02		18
	29	75	67	59	61	57	55	88	70	57	29.98	29.93	29.9	10	10	2	21	8	32	0.02		21
	2	69	58	48	57	49	45	88	64	46	30.04	29.99	29.91	10	9	0	16	6	20	0		16
	5	66	60	55	57	54	50	94	81	59	29.71	29.59	29.56	10	7	0	16	6	28	0.05		20
	8	60	50	39	43	38	36	87	63	42	30.05	29.99	29.89	10	10	2	13	5	20	0.01		18
	11	82	72	62	70	61	45	88	72	49	30.05	29.89	29.81	10	10	3	16	6	21	0.02		18
	14	79	67	59	59	53	50	82	71	52	29.99	29.95	29.88	10	10	9	10	6	-	0		13
	17	82	66	51	59	54	50	100	73	38	30.17	30.1	29.97	10	9	2	12	2	-	0		13
	20	82	70	60	67	60	49	84	62	35	30.07	29.98	29.9	10	10	10	16	8	26	0	Rain , Thunderstorm	17
	23	78	66	55	58	53	48	96	69	41	30.06	29.97	29.85	10	10	5	15	7	18	0.03	Rain	15
	26	81	73	63	70	66	60	100	83	60	30	29.95	29.89	10	9	2	25	8	47	0.39	Rain , Thunderstorm	25
	29	72	55	39	51	43	38	100	75	33	30.22	30.15	30.1	10	8	1	10	3	-	0	Rain	17
	2	75	60	44	59	48	41	100	77	29	30.21	30.17	30.11	10	7	1	10	4	-	0		14
	5	82	72	62	65	63	60	97	74	50	29.9	29.87	29.81	10	9	2	15	4	16	0		16
	8	80	68	57	70	64	57	100	93	66	29.87	29.8	29.73	10	6	0	21	4	31	0.03	Fog , Rain , Thunderstorm	21
	11	84	74	64	73	66	59	100	86	67	30.05	29.99	29.9	10	10	7	12	4	17	0.28	Rain , Thunderstorm	20
	14	78	72	66	70	63	60	90	72	58	29.87	29.78	29.69	10	10	10	20	12	30	0	Rain , Thunderstorm	20
	17	79	66	53	67	60	52	100	83	64	30.14	29.98	29.86	10	9	2	17	6	28	0.45	Rain	17
	20	88	72	57	66	61	55	97	68	43	30.26	30.2	30.1	10	10	2	15	6	20	0		26
	23	91	76	62	70	63	60	100	85	38	30.02	29.98	29.94	10	5	0	9	3	-	0	Fog	16
	26	84	70	57	66	60	57	100	83	41	30.09	30.03	30	10	5	0	12	3	-	0	Fog	15
	29	81	71	62	64	61	57	96	74	48	30.06	30.04	30.01	10	10	6	13	8	-	0.75	Rain	13
	1	81	68	57	65	60	55	100	88	47	30.17	30.12	30.07	10	5	0	13	4	-	0	Fog	14
	4	89	76	62	68	64	61	100	70	46	30.05	29.97	29.83	10	8	2	17	5	23	0		17
	7	79	66	54	61	57	53	100	77	45	30.14	30.1	30.03	10	8	2	12	4	17	0	Rain	16
	10	89	75	62	72	66	57	93	74	51	30.15	30.08	30.04	10	10	5	13	5	-	0		13
	13	77	70	64	71	68	64	100	93	74	29.93	29.81	29.72	10	7	1	12	5	-	0.45	Rain	12
	16	82	74	66	69	65	62	93	76	51	30.06	30.02	29.99	10	10	10	12	4	-	0	Rain	15
	19	79	72	64	72	69	64	100	88	69	29.94	29.88	29.83	10	8	2	13	6	20	0	Rain	24
	22	75	65	55	58	54	51	97	71	46	30.21	30.16	30.09	10	10	10	15	4	18	0.01		16
	25	77	68	60	68	64	59	100	91	56	30.06	29.96	29.91	10	4	0	14	1	-	0	Fog	14
	28	75	68	60	69	64	60	100	85	65	30.28	30.2	30.08	10	9	1	12	6	-	0.01		13
	31	75	64	55	68	59	54	100	76	53	30.16	30.11	30.03	10	9	3	14	6	21	0.14	Rain , Thunderstorm	16
	3	77	60	46	60	53	46	100	90	53	30.34	30.25	30.18	10	5	0	12	4	-	0	Fog	18
	6	88	78	68	74	71	67	96	83	65	30.07	30.01	29.95	10	9	6	13	4	21	0.01	Rain	15
	9	79	66	55	65	59	54	100	92	56	30.02	29.95	29.9	10	3	0	9	2	-	0.01	Fog	23
	12	77	64	52	61	55	50	96	72	47	30.18	30.11	30.01	10	10	10	14	5	22	0		15
	15	73	60	46	59	53	46	100	90	57	30.38	30.27	30.17	10	6	0	9	3	-	0	Fog	15
	18	73	64	55	62	58	55	100	84	57	30.02	29.97	29.9	10	9	2	12	5	-	0		14
	21	75	67	59	66	60	56	97	87	71	30.26	30.17	30.11	10	10	4	17	3	-	0.14	Rain , Thunderstorm	17
	24	70	58	46	53	49	46	100	82	49	30.36	30.28	30.23	10	8	1	10	5	-	0		24
	27	60	56	51	52	48	42	96	77	51	29.81	29.72	29.64	10	10	5	22	15	29	0.69	Rain	22
	30	64	62	57	60	56	54	97	85	75	30.35	30.27	30.15	10	10	4	15	10	22	0.16	Rain	15
	3	64	60	57	58	56	54	96	89	73	30.18	30.13	30.08	10	9	2	8	3	-	0		12
	6	66	57	48	65	55	46	100	97	93	30.2	30.12	30.01	10	3	0	8	3	-	0.19	Fog , Rain	23
	9	59	47	37	42	39	37	97	79	51	30.48	30.44	30.36	10	10	10	7	3	-	0		13
	12	64	56	48	61	51	41	100	87	72	30.14	29.97	29.84	10	8	3	21	8	30	0.95	Rain	21
	15	64	54	44	63	55	41	100	91	77	30.12	29.99	29.87	10	8	2	14	7	24	0.09	Rain	15
	18	77	60	46	63	55	46	100	86	64	29.97	29.66	29.41	10	7	2	21	13	31	0	Rain	21
	21	51	45	39	41	38	35	93	76	62	30.25	30.19	30.12	10	10	10	12	6	22	0.04	Rain	12
	24	51	42	32	43	37	30	97	72	58	30.47	30.33	30.09	10	10	10	16	10	23	0	Rain	17
	27	48	40	33	38	36	32	100	89	66	30.31	30.22	30.11	10	8	1	14	8	-	0.08	Rain	17
	30	54	43	32	46	40	31	100	81	62	30.31	30.19	30.05	10	9	2	16	4	16	0.08	Rain	16
	2	57	50	42	51	46	42	100	95	78	30.25	30.16	30.04	10	6	0	8	4	-	0	Fog , Rain	16
	5	61	46	32	50	39	32	100	97	69	30.37	30.29	30.24	10	2	0	9	3	-	0	Fog , Rain	12
	8	55	48	42	52	44	35	100	81	63	30.32	30.17	30.06	10	9	4	22	10	29	0.09	Rain	22
	11	54	40	25	41	30	23	92	63	47	30.52	30.35	30	10	10	10	18	11	25	0	Rain	18
	14	55	45	35	46	39	34	100	84	62	29.95	29.91	29.85	10	9	2	13	5	-	0	Rain	13
	17	68	52	35	51	45	34	96	69	49	29.99	29.86	29.77	10	8	4	15	8	23	0		29
	20	32	31	30	23	21	19	72	68	60	30.33	30.28	30.23	10	10	9	20	14	31	0	Snow	20
	23	35	32	30	34	30	22	96	87	61	30.32	30.11	29.94	10	8	2	15	9	18	0.08	Rain	16
	26	39	34	30	35	31	28	96	81	70	30.34	30.26	30.12	10	10	9	15	9	-	0	Rain	15
	29	52	48	43	48	42	37	96	81	57	29.62	29.4	29.12	10	10	5	20	10	33	0.44	Rain	20
	2	37	36	34	32	29	25	86	74	64	30.31	30.12	29.9	10	10	8	15	11	22	0.01	Rain	15
	5	41	36	32	34	31	30	100	81	67	30.06	29.95	29.79	10	9	2	18	9	29	0.01	Snow	22
	8	32	28	23	27	23	17	93	80	61	30.31	30.12	29.98	10	5	0	23	17	32	0.02	Fog , Snow	23
	11	26	22	19	25	21	16	93	89	80	30.37	30.01	29.71	8	3	0	14	7	20	0.02	Fog , Snow	24
	14	19	14	8	12	5	0	85	70	59	30.12	29.97	29.9	10	4	0	33	24	45	0	Fog , Snow	33
	17	23	16	9	20	15	7	93	87	74	29.93	29.77	29.69	10	4	0	10	5	18	0.05	Fog , Snow	20
	20	37	32	26	26	22	17	75	66	59	30.34	30.06	29.89	10	10	5	23	14	33	0	Snow	23
	23	41	32	23	32	29	20	100	84	57	30.27	30.1	29.9	10	7	1	12	6	17	0.14	Rain , Snow	23
	26	51	40	27	46	35	19	100	82	56	30.15	29.85	29.68	10	8	2	24	15	36	0.27	Rain , Thunderstorm	24
	29	36	32	28	30	24	18	89	74	61	29.86	29.73	29.6	10	9	2	25	17	34	0	Snow	25
2017	1	37	30	24	27	23	19	93	77	54	30.28	30.11	29.89	10	10	8	20	7	25	0		26
	4	26	19	12	22	9	6	85	78	71	29.96	29.85	29.72	10	6	2	29	22	39	0	Snow	29
	7	12	10	8	7	4	1	85	73	61	30.53	30.37	30.28	9	3	1	25	13	32	0	Snow	25
	10	44	34	24	43	30	21	97	90	75	30.04	29.6	29.07	10	5	1	33	11	47	0.78	Rain , Snow	33
	13	19	14	10	9	8	5	84	71	62	30.86	30.76	30.48	10	9	5	15	9	21	0	Snow	15
	16	36	23	10	31	22	9	96	89	72	30.36	30.27	30.05	10	7	4	10	5	-	0.19	Rain	14
	19	37	34	32	34	33	30	100	93	85	30.07	29.99	29.85	8	4	1	9	6	-	0		10
	22	42	38	35	42	38	35	100	98	92	29.78	29.66	29.57	6	2	0	9	1	-	0	Fog	10
	25	35	34	32	36	33	32	100	98	93	29.85	29.62	29.46	10	4	0	9	2	-	0.38	Fog , Rain , Snow	20
	28	30	27	24	27	22	17	93	78	59	29.78	29.69	29.61	10	7	1	18	12	24	0.02	Snow	18
	31	32	26	23	27	23	19	93	86	72	29.83	29.65	29.51	10	5	0	20	9	26	0	Fog , Snow	24
	3	19	16	14	10	7	5	74	67	62	30.41	30.36	30.23	10	9	4	22	15	28	0	Snow	22
	6	37	27	17	28	22	14	89	75	52	30.11	29.97	29.79	10	10	9	12	5	-	0		18
	9	19	16	12	10	7	3	74	68	62	30.29	30.16	30	10	8	1	24	16	30	0	Snow	24
	12	39	34	30	34	27	17	93	76	50	30.25	29.98	29.84	10	9	2	25	7	38	0.07	Rain , Snow	25
	15	30	27	24	23	18	14	86	71	60	29.96	29.88	29.74	10	9	2	20	15	32	0	Snow	20
	18	53	42	28	38	34	27	96	77	57	29.85	29.71	29.59	10	10	8	13	6	-	0		14
	21	54	45	36	49	43	34	97	82	52	29.97	29.93	29.84	10	8	2	14	7	21	0.21	Rain	17
	24	35	32	30	34	31	27	100	94	87	29.92	29.64	29.44	10	4	1	18	11	29	0.61	Rain , Snow	23
	27	44	32	21	29	23	18	96	70	40	30.23	30.16	30.04	10	10	10	13	6	-	0		24
	2	28	24	21	23	18	13	93	76	54	30.37	30.22	30.04	10	5	0	23	11	30	0	Fog , Snow	23
	5	46	35	24	33	23	15	72	58	42	30.54	30.26	30.05	10	10	10	16	11	24	0		29
	8	39	36	32	31	19	12	73	52	41	30.11	29.84	29.69	10	10	6	31	22	44	0	Rain , Snow	31
	11	19	17	15	10	7	1	71	63	54	30.54	30.49	30.42	10	9	6	18	12	24	0	Snow	18
	14	24	16	10	15	9	0	84	67	38	30.43	30.36	30.28	10	9	2	16	9	25	0	Snow	18
	17	35	28	21	34	26	17	100	84	50	30.27	30.05	29.92	10	5	0	14	6	21	0.06	Fog , Rain , Snow	14
	20	48	40	28	38	34	26	96	82	66	30.19	30.12	30.07	10	10	5	12	6	-	0.03		20
	23	42	28	15	23	14	7	96	56	26	30.58	30.39	30.09	10	10	10	14	6	20	0	Rain	21
	26	48	42	37	46	42	36	100	95	90	30.15	29.93	29.83	10	5	0	12	7	-	0.29	Fog , Rain	15
	29	50	38	27	36	31	25	96	74	46	30.39	30.33	30.25	10	10	8	15	5	17	0		21
	1	55	38	21	32	23	7	100	72	15	30.27	30.17	30.05	10	8	1	9	1	-	0		15
	4	48	44	39	45	39	24	97	83	45	30	29.66	29.36	10	10	5	16	8	25	0.44	Rain	24
	7	48	39	25	28	23	18	88	54	32	30.14	30.07	30	10	10	10	20	12	26	0		20

10	69	54	39	55	45	37	100	82	55	30.02	29.82	29.64	10	10	3	16	10	22	0.47	Rain , Thunderstorm	16
13	57	46	35	41	36	30	89	69	51	30.52	30.46	30.4	10	10	10	10	3	-	0	Rain	20
16	64	52	39	57	51	35	100	91	37	30.11	29.84	29.72	10	6	0	22	7	30	0.63	Fog , Rain , Thunderstorm	22
19	64	55	44	49	42	38	87	70	45	30.26	30.08	29.92	10	10	10	21	11	26	0		32
22	57	40	25	35	28	23	96	64	31	30.31	30.25	30.18	10	10	9	10	3	-	0		14
25	75	64	52	54	48	39	75	60	46	29.87	29.77	29.68	10	10	8	12	9	18	0		28
28	48	42	39	41	35	32	93	77	59	30.11	29.92	29.73	10	10	9	20	11	23	0.03	Rain	20
1	57	48	39	52	43	37	100	84	57	29.77	29.5	29.36	10	10	5	17	12	26	0.41	Rain , Thunderstorm	21
4	63	48	33	36	32	28	96	60	30	30.2	30.09	29.99	10	10	10	15	5	23	0		24
7	46	40	33	30	24	15	70	53	28	30.15	30.05	29.96	10	10	10	23	12	33	0		23
10	63	50	39	43	35	26	93	58	27	30.08	30.04	29.99	10	10	10	13	3	-	0.01	Rain	14
13	72	52	34	49	42	33	97	74	39	30	29.91	29.83	10	10	4	16	5	24	0		16
16	81	66	53	64	57	50	97	77	45	29.94	29.81	29.68	10	9	2	17	6	30	0.32	Rain , Thunderstorm	30
19	57	48	39	39	35	28	89	67	41	30.33	30.24	30.11	10	10	10	13	8	18	0		20
22	64	55	46	47	44	41	93	73	52	29.99	29.94	29.87	10	10	4	18	12	26	0.02	Rain	18
25	66	60	53	55	53	50	93	79	67	29.78	29.67	29.6	10	10	9	15	8	21	0		15
28	66	59	52	58	54	50	100	88	68	29.88	29.77	29.68	10	8	2	12	4	-	0.69	Rain , Thunderstorm	17
31	66	58	50	48	46	43	83	68	44	30.06	29.96	29.92	10	10	10	16	9	23	0		16
3	79	64	50	61	55	47	94	73	45	30.09	30.01	29.91	10	10	7	22	6	38	0.25	Rain , Thunderstorm	22
6	69	57	45	52	49	44	97	70	51	30.16	30.09	30.05	10	10	10	17	5	22	0		17
9	77	65	53	58	54	51	96	69	44	29.88	29.83	29.81	10	10	10	14	4	17	0	Rain	23
12	82	73	64	70	65	58	97	78	55	30.03	29.92	29.83	10	8	0	30	6	46	0.94	Rain , Thunderstorm	30
15	81	70	60	70	65	60	100	90	64	29.88	29.83	29.79	10	7	0	14	3	-	0.03	Fog , Rain , Thunderstorm	18
18	70	67	61	68	63	57	100	90	70	29.73	29.53	29.45	10	6	0	22	6	30	0.21	Fog , Rain , Thunderstorm	22
21	73	60	46	58	51	46	100	82	44	30.04	29.98	29.92	10	5	0	10	3	-	0.01	Fog	13
24	68	60	52	57	55	52	100	80	63	30	29.91	29.79	10	10	8	16	5	22	0	Rain	18
27	70	56	42	55	47	42	100	88	47	30.12	30.06	30.02	10	5	0	12	2	-	0	Fog	16
30	75	67	59	66	62	58	100	84	64	29.88	29.84	29.8	10	9	3	12	4	-	0		17
3	75	62	51	58	54	52	100	85	50	30.17	30.11	30.05	10	5	0	12	3	-	0.01	Fog , Rain	13
6	84	72	59	70	64	57	93	77	60	30.06	29.97	29.82	10	9	2	12	4	18	0		15
9	80	66	54	63	59	52	97	80	56	30.02	29.99	29.94	10	10	10	14	5	23	0.07	Rain	14
12	80	72	64	72	68	63	97	87	69	29.95	29.89	29.83	10	9	1	14	4	24	0.2	Rain , Thunderstorm	14
15	75	63	51	64	57	51	100	88	58	30.18	30.11	29.97	10	5	0	14	3	22	0	Fog	14
18	82	66	51	64	57	50	100	80	52	30.12	30.07	30.03	10	8	1	12	3	17	0.53		13
21	87	73	60	72	66	61	100	85	46	30.04	29.99	29.93	10	10	10	8	4	-	0		14
24	75	64	54	60	55	52	93	71	48	30.17	30.04	29.89	10	10	10	17	7	20	0		17
27	82	72	62	68	64	56	100	81	46	30.04	30	29.94	10	10	10	15	3	18	0.01		15
30	80	64	48	60	55	49	100	73	44	30.25	30.22	30.19	10	10	10	14	3	18	0		14
2	78	70	62	70	66	61	97	81	66	30.11	30.04	30	10	10	10	14	6	18	0.01		17
5	72	64	55	57	53	49	97	70	47	30.07	30.03	29.95	10	10	10	12	6	-	0		13
8	79	63	48	62	56	48	100	77	48	30.18	30.15	30.13	10	10	10	14	4	-	0		15
11	71	63	57	64	60	56	100	87	73	30.02	29.97	29.92	10	10	10	14	5	21	0.01		14
14	75	64	54	60	56	52	100	79	44	30.04	29.95	29.88	10	10	10	6	2	-	0		14
18	70	67	63	66	62	60	96	83	73	29.9	29.77	29.61	10	10	10	17	12	24	0.03		17
21	81	70	60	72	67	59	100	87	69	30.11	30.03	29.87	10	10	10	8	2	-	0		17
24	66	56	45	51	47	44	100	77	48	30.25	30.19	30.11	10	10	10	17	3	23	0		17
27	69	62	55	59	56	54	97	80	68	30.28	30.18	30.07	10	10	10	10	5	-	0.06	Rain	13
30	77	65	53	66	60	54	100	92	60	30.14	30.06	30.01	10	5	0	14	3	17	0.06	Fog , Rain	15
2	69	54	39	56	46	37	100	91	52	30.22	30.11	29.93	10	6	0	13	3	-	0.03	Fog , Rain , Thunderstorm	15
5	64	57	48	54	52	48	97	77	62	29.96	29.82	29.72	10	10	5	18	11	24	0.08	Rain	18
8	64	52	39	52	45	39	100	89	56	30.44	30.21	30.03	10	5	0	13	2	-	0.02	Fog , Rain	13
11	71	54	39	57	47	39	100	93	54	30.44	30.29	30.12	10	4	0	12	3	-	0	Fog	12
14	75	60	46	64	53	46	100	96	69	29.99	29.87	29.8	10	3	0	9	3	-	0	Fog	13
17	79	67	57	66	62	57	97	85	71	30.14	30.07	30.01	10	10	10	13	5	-	0		13
20	84	69	54	67	63	53	100	85	54	30.02	29.96	29.89	10	7	1	12	5	18	0		18
23	91	76	62	69	66	61	97	76	47	30.13	30.1	30.04	10	9	4	12	4	-	0		12
26	88	72	57	68	62	56	96	75	44	29.99	29.96	29.92	10	10	8	15	6	20	0.05	Rain	16
29	64	56	43	56	50	42	100	76	54	30.44	30.16	29.99	10	10	9	20	8	28	0.05	Rain	20
2	78	63	48	56	50	42	83	63	42	30.28	30.24	30.21	10	10	7	10	7	22	0		15
5	61	50	39	53	46	39	100	80	62	30.26	30.21	30.14	10	10	7	13	6	-	0.01	Rain	14
8	75	64	51	60	56	50	100	81	48	29.85	29.74	29.49	10	10	2	17	9	30	0.02		17
11	62	53	44	49	46	44	100	84	58	30.33	30.26	30.21	10	10	10	14	9	21	0.06	Rain	14
14	57	55	53	56	53	49	100	96	77	30.24	30.08	29.74	10	6	0	16	5	18	0.01	Fog , Rain	21
17	63	50	37	50	45	37	97	78	56	30.19	30.14	30.1	10	10	10	14	5	21	0		20
20	75	57	39	54	46	37	96	70	43	30.21	30.15	30.08	10	10	10	12	6	20	0		22
23	52	49	46	50	49	45	96	94	87	30.05	29.83	29.48	10	9	4	9	2	-	1.74	Rain	30
26	51	38	26	36	29	25	100	86	56	29.99	29.89	29.77	10	6	0	14	4	21	0	Fog	14
29	43	36	30	37	35	30	100	90	70	29.93	29.86	29.73	10	10	5	6	2	-	0.04	Rain	32
1	39	36	33	34	32	29	93	84	67	30.12	30.05	29.94	10	9	2	9	5	16	0.01	Rain	14
4	42	39	36	41	36	29	100	85	70	30.42	30.13	29.88	10	9	4	15	10	20	0	Rain	16
7	43	33	21	35	26	20	97	78	56	30.41	30.38	30.3	10	10	10	12	3	-	0		23
10	26	22	17	16	12	5	86	70	48	30.71	30.55	30.38	10	7	1	18	11	28	0	Snow	18
13	41	34	27	36	31	25	96	84	62	30.48	30.44	30.38	10	8	5	10	2	-	0		25
16	39	34	28	34	29	23	93	82	70	30.33	30.17	29.85	10	8	2	26	16	36	0	Rain , Snow	26
19	35	32	28	30	23	18	87	71	56	30.01	29.91	29.76	10	8	2	21	14	26	0	Rain , Snow	23
22	30	29	28	23	20	18	75	67	64	30.35	30.27	30.15	10	10	9	10	7	20	0	Snow	18
25	48	40	30	46	33	21	97	73	57	30.18	29.82	29.48	10	10	10	18	13	25	0	Rain	18
28	55	50	44	42	35	24	80	56	45	30.12	29.9	29.78	10	10	10	18	12	26	0		23
1	46	34	21	33	28	19	96	78	50	30.29	30.24	30.2	10	10	10	12	4	18	0		14
4	60	52	44	52	43	30	93	72	56	30.1	29.72	29.38	10	9	2	25	12	38	0	Rain , Thunderstorm	28
7	26	24	23	22	18	14	91	79	64	30.08	30	29.92	10	5	1	18	13	25	0	Snow	18
10	28	24	21	23	18	12	86	74	63	30.09	29.95	29.86	10	9	2	14	10	20	0	Snow	26
13	19	17	15	18	14	10	93	85	68	29.9	29.64	29.41	10	3	0	18	8	25	0	Fog , Snow	20
16	27	22	18	20	17	14	92	79	68	30.24	30.03	29.86	10	8	2	13	6	-	0	Snow	14
19	42	38	30	35	28	16	79	66	48	30.07	29.84	29.72	10	10	10	29	16	38	0		29
22	35	31	27	30	27	24	93	85	72	30.09	30.05	29.99	10	8	1	13	7	-	0	Rain , Snow	17
25	21	13	3	16	4	-2	85	73	65	30.38	30.12	29.91	10	3	0	29	20	37	0	Fog , Snow	29
28	12	8	5	7	5	1	92	83	70	30.73	30.57	30.32	10	4	1	12	6	16	0	Snow	20
31	12	6	0	9	2	-4	92	80	61	30.56	30.48	30.41	10	4	0	15	5	23	0	Fog , Snow	15
																					0
																					0
																					0
																					0
																					0
																					0

	Tons
Outdoor Storage Piles	13.47
Unpaved roads	2.60
Paved roads	7.03
Other sources	0.85
Sum	23.95

PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER		PLACE NAME & NUMBER	
1	GARAGE	16	MAIN OFFICE (ANNEX)	31	CHIP WASHING			61	GAS METER HOUSE											130	NORTH HI-DENSITY CHEST		
2	POWER HOUSE	17	MAIN OFFICE (ANNEX)	32	LAKE WATER PUMP HOUSE	47	VEHICLE WASH BUILDING	62	PCB STORAGE BUILDING									116	ISOPAR TANK				
3	POWER HOUSE	18	NO.1 & 2 PULP MILL, UPPER LAB	33	WOOD ROOM – CHIPPING			63	FIRE PUMP HOUSE														
4	POWER HOUSE					49	PRODUCTION CONFERENCE ROOM			79	EMERGENCY EFFLUENT GENERATOR BUILDING					104	BLACK LIQUOR TANK NO.1	118	#1 REFINER CHEST			148	DIESEL TANK
5	LIQUOR MAKING	20	REACTOR BUILDING	35	NORTH TRUCK DUMPER	50	PAPER TEST LAB									105	BLACK LIQUOR TANK NO.2	119	FUEL OIL STORAGE	134	ISOPAR STORAGE		
6	MAINTENANCE SHOP			36	SOUTH TRUCK DUMPER	51	WASTE PAPER SCREENING	66	EQUIPMENT STORAGE (2 BLDGS)							106	BLACK LIQUOR TANK NO.3	120	SOUTH HI-DENSITY CHEST			150	#1 AERATION BASIN
7	NO. 1 & 2 PULP MILLS					52	WASTE PAPER PROCESSING			82	EMERGENCY LIFT STATION GENERATOR BLDG.					107	NORTH CHIP SILO	121	NORTH LOW-DENSITY CHEST	136	PHOSPHORIC ACID TANK	151	#2 AERATION BASIN
8	NO. 1 & 2 PULP MILLS	23	MAINTENANCE BUILDING			53	WASTE PAPER STORAGE			83	SOUTH SCALE HOUSE					108	SOUTH CHIP SILO	122	GASOLINE PUMP (UST)			152	PROPANE TANK
9	NO. 1 & 2 PULP MILLS	24	PIPE SHOP	39	PRIMARY CLARIFIER	54	STORE ROOM											123	#3 BROKE CHEST	138	CLARIFIER NO. 1	153	PROPANE TANK
10	NO.1 & 2 BEATER ROOM			40	EFFLUENT PUMP HOUSE	55	BIO-ENERGY CONDITIONING BLDG.	70	LIFT STATION							110	WEST CHIP SILO			139	CLARIFIER NO. 2		
11	NO. 1 PAPER MACHINE	26	NO. 3 PULP MILL			56	BIO-ENERGY ANEROBIC TREAT. BLDG.													140	THICKENER	155	PROPANE TANK
12	NO.1 & 2 ROLL PIT	27	NO. 3 PULP MILL	42	FILTER PLANT	57	MULTIPLEX BUILDING	72	SECONDARY TREATMENT													156	PROPANE TANK
13	NO.1 & 2 ROLL STORAGE	28	NO. 3 PAPER MACHINE	43	RESERVOIR	58	WASTE OIL STORAGE BUILDING	73	AERATION BASIN SUBSTATION													157	PROPANE TANK
14	NO. 2 PAPER MACHINE					59	OUT BUILDING	74	SEC. SLUDGE CONTAINMENT													159	BOILER WATER PRECIPITATOR
15	NO.1 & 2 SHIPPING	30	CHIP SCREEN BLDG./TRUCK DUMPER			60	GAS METER HOUSE									115	TEMPORARY SLUDGE CONTAINMENT			144	BLACK LIQUOR TANK NO.4	160	BRINE (UST)

REV	DATE	BY	APP.	DESCRIPTION
1	1/7/14	DU	SK	ADDED TRAILER DROP LOT & SECONDARY SLUDGE CONTAINMENT

PACKAGING CORPORATION OF AMERICA

FILER MILL
PLANT MAP SHOWING
FUGITIVE DUST CONTROL

SCALE: 1" = 100'	JOB NO: P-0000	DRAWING NUMBER
DRAWN: D. UHAZIE	DATE: 6-28-10	D-0000-200-1-5-7-1
CHECKED: R. SMITHE	BLDG: 200	
FILE: FUGIDUST	DISC:	

Packaging Corporation of America

Malfunction Abatement Plan

Filer City Containerboard Mill

9-27-2019

Contents

Overview of Requirements

The Packaging Corporation of America Filer City Mill is required under Michigan Rule 336.1911 "Malfunction abatement plans" and Renewable Operating Permit MI-ROP-B3692-2015b to implement and maintain a source-wide Malfunction Abatement Plan (MAP) approved by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) District Supervisor. If the MAP fails to address or inadequately addresses an event that meets the characteristics of a malfunction, the permittee shall revise the MAP within 45 days after such an event occurs. The revised plan shall include procedures for operating and maintaining the process equipment and add-on air pollution control device during similar malfunction events, and a program for corrective action for such events.

As defined in Michigan Rule 336.1113, a "malfunction" means any sudden, infrequent and not reasonable preventable failure of a source, process, process equipment, or air pollution control equipment to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operations are not malfunctions.

Requirements for each emission unit's malfunction abatement plan are summarized as:

- Emission unit name
- Pollution control equipment
- Supervision in charge of operation
- Supervision in charge of maintenance
- Items or conditions requiring inspection and frequency of inspection
- A list of major replacement parts
- A list of monitoring parameters and the range of the conditions
- A procedure for correcting malfunctions

Notification Procedures

When a malfunction or failure is observed for any of the reasons described in each control device section, the actions outlined below will be taken to alert an outside agency:

1. Verification of the value of the operating parameter.
2. Initial correction attempt.
3. Response to unsuccessful correction attempts.
4. Secondary correction attempt.
5. Repair and inspection.
6. Estimate time for safe process shutdown if necessary.
7. Report malfunction to Environmental Manager.
8. Report malfunction to EGLE following the requirements in MI-ROP-B3692-2015b.

Power Boiler #2 (EUBOILER2)

- Emission unit name
    - EUBOILER2
- Pollution control equipment
    - Low NOx Burners
- Supervision in charge of operation
    - Powerhouse Supervisor
    - Powerhouse Superintendent
- Supervision in charge of maintenance
    - Power/Recovery/Environmental Maintenance Supervisor
    - North End Maintenance Superintendent
- Items requiring inspection and frequency of inspection
    - Boiler MACT (Subpart DDDDD) Tune-up annually
    - Mill-Wide shutdown, approximately every 18 months:
        - Check the general cleanliness and operation of the low NOx burners
        - Check the condition of the burners
        - Check the condition of the diffusers
- Major replacement parts
    - Spare parts are maintained to ensure compliant operation
- Monitoring parameters and the range of the conditions
    - General
        - Burner is on and boiler is operating properly according to good general boiler operating practices
    - Boiler CEMS
        - Boiler CEMS are operated and maintained according to the CEMS QA/QC Program
        - Emissions are monitored continuously by boiler operators. Daily boiler reports are evaluated by Mill Technical/Supervisor Staff
        - NO_x and O_2 CEMS daily drift check
            - 0-5% , calibration pass
            - 5-10%, bad calibration
            - >10%, failed calibration
- Procedure for correcting malfunctions
    - Attempt initial correction without reducing load to boiler if there is no risk to safety or environment
    - Contact operation and maintenance supervision to assist in troubleshooting
    - If needed reduce load on boiler and correct issues causing burners to malfunction

Power Boiler #4 (EUBOILER4A)

- Emission unit name
  - EUBOILER4A
- Pollution control equipment
  - Low NOx Burners
- Supervision in charge of operation
  - Powerhouse Supervisor
  - Powerhouse Superintendent
- Supervision in charge of maintenance
  - Power/Recovery/Environmental Maintenance Supervisor
  - North End Maintenance Superintendent
- Items requiring inspection and frequency of inspection
  - Boiler MACT (Subpart DDDDD) Tune-up every 5 years
  - Mill-Wide shutdown, approximately every 18 months:
    - Check the general cleanliness and operation of the low NOx burners
    - Check the condition of the burners
    - Check the condition of the diffusers
- Major replacement parts
  - Spare parts are maintained to ensure compliant operation
- Monitoring parameters and the range of the conditions
  - General
    - Burner is on and boiler is operating properly according to good general boiler operating practices
  - Boiler CEMS
    - Boiler CEMS are operated and maintained according to the CEMS QA/QC Program
    - Emissions are monitored continuously by boiler operators. Daily boiler reports are evaluated by Mill Technical/Supervisor Staff
    - NO_x and O_2 CEMS daily drift check
      - 0-5% , calibration pass
      - 5-10%, bad calibration
      - >10%, failed calibration
- Procedure for correcting malfunctions
  - Attempt initial correction without reducing load to boiler if there is no risk to safety or environment
  - Contact operation and maintenance supervision to assist in troubleshooting
  - If needed reduce load on boiler and correct issues causing burners to malfunction

Brown Stock Wash (EUWASHERS)

- Emission unit name
  - EUWASHERS
- Pollution control equipment
  - LVHC Collection System
  - One of the Following
    - Power Boiler #1
    - Power Boiler #2
    - Power Boiler #4
- Supervision in charge of operation
  - Powerhouse Supervisor
  - Wood Yard Supervisor
  - Powerhouse Superintendent
  - Pulp/Wood Yard Superintendent
- Supervision in charge of maintenance
  - Power/Recovery/Environmental Maintenance Supervisor
  - Pulp/Wood Yard Maintenance Supervisor
  - North End Maintenance Superintendent
- Items or conditions requiring inspection and frequency of inspection
  - Rupture Discs and Bypass Valves in the Closed Position
    - Monitored continuously according to the LVHC Inspection Plan
  - Destruction Device (Power Boiler #1,#2, or #4) available
    - Monitored continuously by operator
  - Monthly visual inspection for leaks
- Major replacement parts
  - Spare parts are maintained to ensure compliance operation
- Monitoring parameters and the range of the conditions
  - Rupture Discs and Bypass Valves are monitored continuously according to the LVHC Inspection Plan
- Procedure for correcting malfunctions
  - Attempt initial correction without reducing load/stopping equipment if there is no risk to safety or environment
  - Contact operation and maintenance supervision to assist in troubleshooting
  - If needed reduce/stop load and correct issues

Subpart S – Digesters, Recovery Evaporators (FGMACT SUBPART S)

- Emission unit name
  - FGMACT SUBPART S
    - EUEVAPFC
    - EUEVAPLTV
    - EUDIGESTORS
- Pollution control equipment
  - LVHC Collection System
  - One of the Following
    - Power Boiler #1
    - Power Boiler #2
    - Power Boiler #4
- Supervision in charge of operation
  - Powerhouse Supervisor
  - Wood Yard Supervisor
  - Powerhouse Superintendent
  - Pulp/Wood Yard Superintendent
- Supervision in charge of maintenance
  - Power/Recovery/Environmental Maintenance Supervisor
  - Pulp/Wood Yard Maintenance Supervisor
  - North End Maintenance Superintendent
- Items or conditions requiring inspection and frequency of inspection
  - Rupture Discs and Bypass Valves in the Closed Position
    - Monitored continuously according to the LVHC Inspection Plan
  - Destruction Device (Power Boiler #1,#2, or #4) available
    - Monitored continuously by operator
  - Monthly visual inspection for leaks
- Major replacement parts
  - Spare parts are maintained to ensure compliance operation
- Monitoring parameters and the range of the conditions
  - Rupture Discs and Bypass Valves are monitored continuously according to the LVHC Inspection Plan
- Procedure for correcting malfunctions
  - Attempt initial correction without reducing load/stopping equipment if there is no risk to safety or environment
  - Contact operation and maintenance supervision to assist in troubleshooting
  - If needed reduce/stop load and correct issues

Wood Chip Transport (EUWOODCHIPTRAN)

- Emission unit name
  - EUWOODCHIPTRAN
- Pollution control equipment
  - Cyclone
- Supervision in charge of operation
  - Wood Yard Supervisor
- Supervision in charge of maintenance
  - Pulp/Wood Yard Maintenance Supervisor
  - North End Maintenance Superintendent
- Items or conditions requiring inspection and frequency of inspection
  - non-certified visible emission observation at outlet of cyclone
- Major replacement parts
  - Spare parts are maintained to ensure compliance operation
- Monitoring parameters and the range of the conditions
  - Cyclone Emissions
    - No visible emissions
- Procedure for correcting malfunctions
  - Attempt initial correction without reducing load/stopping equipment if there is no risk to safety or environment
  - Contact operation and maintenance supervision to assist in troubleshooting
  - If needed reduce/stop load and correct issues
  - If visible emissions are observed, correct and document the problem within 2 hours
  - Re-perform visible emissions check
  - Repeat until no visible emissions are present

Copeland Reactor (EUCOPELAND+DISTANK)

- Emission unit name
  - EUCOPELAND+DISTANK
- Pollution control equipment
  - Venturi Scrubber
  - Mist Eliminator
  - Regenerative Thermal Oxidizer
- Supervision in charge of operation
  - Powerhouse Supervisor
  - Powerhouse Superintendent
- Supervision in charge of maintenance
  - Power/Recovery/Environmental Maintenance Supervisor
  - North End Maintenance Superintendent
- Items or conditions requiring inspection and frequency of inspection
  - During periods of shutdown:
    - Check the general cleanliness of control equipment
    - Change demisting pads if needed
    - Inspect and change RTO saddles if needed
- Major replacement parts
  - Spare parts are maintained to ensure compliant operation
- Monitoring parameters and the range of the conditions
  - Venturi Scrubber
    - Differential pressure is ≥ 38 inches of water when in operation
  - Mist Eliminator
    - Installed when in operation
  - Regenerative Thermal Oxidizer
    - 1 hour average temperature is greater than the most recent established performance test when in operation
    - 2015 test – 1693°F
- A procedure for correcting malfunctions
  - Attempt initial correction without reducing load/stopping equipment if there is no risk to safety or environment
  - Contact operation and maintenance supervision to assist in troubleshooting
  - If needed reduce/stop load and correct issues

Soda Ash Silo (EUSODA-ASH)

- Emission unit name
    - EUSODA-ASH
- Pollution control equipment
    - Baghouse
- Supervision in charge of operation
    - Pulp Mill Supervisor
    - Pulp/Wood Yard Superintendent
- Supervision in charge of maintenance
    - Pulp/Wood Yard Maintenance Supervisor
    - North End Maintenance Superintendent
- Items or conditions requiring inspection and frequency of inspection
    - The baghouse is installed and operating properly
        - Incorporated into Basic Care/Shift Inspections
    - A device for monitoring the differential pressure across the baghouse is installed and operating
        - Monitored continuously
- Major replacement parts
    - Spare parts are maintained to ensure compliance operation
- Monitoring parameters and the range of the conditions
    - Baghouse differential pressure range: 0-15 inches H_2O
- Procedure for correcting malfunctions
    - Attempt initial correction without reducing load/stopping equipment if there is no risk to safety or environment
    - Contact operation and maintenance supervision to assist in troubleshooting
    - If needed reduce/stop load and correct issues

Copeland Reactor Pellet Silo (EUPELLET)

- Emission unit name
  - EUPELLET
- Pollution control equipment
  - Baghouse
- Supervision in charge of operation
  - Powerhouse/Recovery Supervisor
  - Powerhouse/Recovery Superintendent
- Supervision in charge of maintenance
  - Power/Recovery/Environmental Maintenance Supervisor
  - North End Maintenance Superintendent
- Items or conditions requiring inspection and frequency of inspection
  - The baghouse is installed and operating properly
    - Incorporated into Basic Care/Shift Inspections
  - A device for monitoring the differential pressure across the baghouse is installed and operating
    - Monitored continuously
- Major replacement parts
  - Spare parts are maintained to ensure compliance operation
- Monitoring parameters and the range of the conditions
  - Baghouse differential pressure range: 0-6 inches H_2O
- Procedure for correcting malfunctions
  - Attempt initial correction without reducing load/stopping equipment if there is no risk to safety or environment
  - Contact operation and maintenance supervision to assist in troubleshooting
  - If needed reduce/stop load and correct issues

Biogas (FGBIOGASSYSTEM)

- Emission unit name
    - FGBIOGASSYSTEM
        - EUBOILER1
        - EUBOILER2
        - EUBOILER4A
        - EUBIOGASSYSTEM
        - EUBIOGASFLARE
- Pollution control equipment
    - Any one of the following
        - EUBOILER1
        - EUBOILER2
        - EUOBOILER4A
        - EUBIOGASFLARE
- Supervision in charge of operation
    - Power/Recovery Supervisor
    - Power/Recovery Superintendent
- Supervision in charge of maintenance
    - Power/Recovery Maintenance Supervisor
    - North End Maintenance Superintendent
- Items or conditions requiring inspection and frequency of inspection
    - A destruction device is in operation when operating EUBIOGASSYSTEM
        - Basic Care/ Shift Inspections
        - Monitored continuously by operators
- Major replacement parts
    - Spare parts are maintained to ensure compliant operation
- Monitoring parameters and the range of the conditions
    - A destruction device is in operation
- Procedure for correcting malfunctions
    - Attempt initial correction without reducing load/stopping equipment if there is no risk to safety or environment
    - Contact operation and maintenance supervision to assist in troubleshooting
    - If needed reduce/stop load and correct issues

Continuous Emissions Monitoring System

Quality Assurance And Quality Control Plan

Company: Packaging Corp.
Site: Filer City, MI
System: CEMS
Revision Date: August 11, 2017

Table of Contents

Introduction

This Quality Assurance/Quality Control (QA/QC) Plan has been prepared to support the operation of the Continuous Emissions Monitoring System (CEMS) at Packaging Corp., Filer City, MI installed for measurement of pollutant concentrations of nitrogen oxide (NO_X) and Oxygen (O_2).

The EPA has established requirements for monitoring, record keeping, and reporting pollutant levels in flue gases emitted from affected units. The CEMS discussed in this manual are governed by the regulations established under *Title 40 Code of Federal Regulations Part 60* (40 CFR Part 60), Appendix B, Performance Specifications and Appendix F, Quality Assurance Procedures, which include general requirements for the installation, certification, operation, and maintenance of the CEMS.

Definitions of Quality Assurance and Quality Control

The QA procedures consist of two distinct and equally important functions.

Quality Assurance is the series of activities performed to evaluate the overall effectiveness of the maintenance and QC efforts. QC involves those activities undertaken to determine that the product or service is effective in maintaining an accurate and reliable output of CEMS data.

Quality Control functions are the control and improvement of the quality of the CEMS data by implementing QC policies and corrective actions. QC functions are often comprised of a series of frequent internal checks, such as system inspections, periodic calibrations, and routine maintenance. Quality Assurance involves less frequent external checks on product quality and is used to evaluate the total quality control process.

These two functions form a control loop: When the evaluation function indicates that the data quality is inadequate, the control effort must be increased until the data quality is acceptable. In order to provide uniformity in the assessment and reporting of data quality, this procedure explicitly specifies the assessment methods for response drift and accuracy.

External quality assurance evaluations may include independent system audits, third party sampling and analysis, and/or comparisons to known calibration standards.

Quality Assurance Policy

It is the policy of Packaging Corp.'s to efficiently operate and maintain its facilities in accordance with good operating practices (GOP) and applicable environmental regulations. Packaging Corp. is committed to ensuring that all environmental systems are operating within acceptable limits and that its operations are in compliance with operating and environmental permits.

Objective of Quality Assurance Plan

Packaging Corp. recognizes that the reliability and acceptability of CEMS data depends on completion of all activities stipulated in a well-defined QA plan. The objective of this QA plan is to define the necessary activities that guarantee CEMS data quality is maintained at acceptable levels. The plan also provides the framework for implementing QA activities by addressing items such as documentation, training, corrective actions, and preventive maintenance measures.

Scope of Quality Assurance Plan

This QA plan is specific to the operation and maintenance of the CEMS installed at Packaging Corp., Filer City, MI. The QA Plan goal is to obtain and evaluate emissions data of known and acceptable quality in support of the air pollution control equipment operation. The data obtained is used to demonstrate compliance with the following EPA, state and local emission and monitoring regulations:

40 CFR 60, Appendix B, Performance Specifications

40 CFR 60, Appendix F; Quality Assurance Procedures

Packaging Corp. Operating Permit

Additionally, this plan describes the necessary support services and activities, such as manual source testing, data reduction and report preparation, required to maintain data quality. However, this plan is not exhaustive in that some QA/QC activities are not discussed in detail here. Activities not fully discussed may include, but are not limited to, instrument maintenance, plant operating procedures, plant quality control procedures, and plant internal procedures for procurement and inventory control. These activities may be referenced in this QA Plan and may be updated, replaced, or deleted without notice or change to this plan.

Document Control

This QA/QC Plan includes procedures that ensure changes and revisions to this plan are communicated to all appropriate individuals. The Plant Manager will be responsible for ensuring that all changes and revisions are incorporated in the basic document. Periodic review of this QA Plan will help to insure that the QA process is working to provide efficient notice of required actions. Whenever inaccuracies occur for two consecutive quarters, Packaging Corp. must revise the current procedures or modify or replace the CEMS to correct the deficiency causing the excessive inaccuracies. The procedures must be kept on record and available for inspection by the enforcement agency.

This quality assurance plan must be reviewed annually. If revised, the revised QA plan must be submitted with the report of required annual quality assurance activities. Quality assurance plans for monitoring systems approved prior to the effective date of this manual revision must be submitted with the first report of required annual quality assurance activities conducted after such effective date.

Description of Facility and CEMS

Facility

The PCA Filer City Mill is located at 2246 Udell Street in filer City, Michigan and is a semi-chemical mill that produces corrugated medium, which is used as the inner layer in corrugated cardboard. The plant produces the corrugated medium from whole logs, which are debarked and then processed into chips which pass through scalping screens and are transferred to storage piles or storage silos. Purchased chips are also used along with recycled cardboard.

Particulate emissions from processing, conveying and transfer of the chips are controlled by cyclone dust collection systems. The chips are softened in digesters by cooking under high pressure using sodium carbonate solution (white liquor) and mechanical action is used to separate the wood fibers. The fibers are then washed, mixed with various additives in the stock chests and processed on the paper machines into corrugated medium.

Non-condensable gasses (NCGs) from the pulping process are collected by the Low Volume High Concentration (LVHC) system which routes the NCGs to the Mill's No. 1 and 2 boilers where they are thermally oxidized. The resulting solution after the fibers have been removed is referred to as black liquor. The black liquor is burned through a fluidized bed reactor (Copeland reactor) to produce sodium carbonate that is used again to produce white liquor in the process.

Exhaust gasses from the Copeland reactor are controlled by cyclones, a venturi scrubber, and a Regenerative Thermal Oxidizer. A wet electrostatic precipitator (WESP) is located following the venturi scrubber and demister that control the PM emissions from the Copeland reactor. The WESP is located prior to the regenerative thermal oxidizer but only serves to protect the operation of this unit and not to demonstrate compliance with any emission limits. Polished whitewater from the paper machines, black liquor and other process waste streams can be digested in the biogas system by anaerobic microorganisms.

A product of this biological digestion is the generation of methane-rich biogas that is scrubbed and then fired as fuel in Boiler No. 1, Boiler No. 2, and/or Boiler No. 4A. The No. 1 and No. 2 boilers also have the capability to be fired on coal, oil, or natural gas and are controlled by a shared baghouse when burning coal. The No. 4A boiler burns natural gas and biogas and is equipped with low NOx burners.

EUBOILER2 at the stationary source is subject to the New Source Performance Standards for Industrial-Commercial-Institutional Steam Generating Units promulgated in Title 40 CFR Part 60, Subparts A and Db. It is also subject to the NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters in 40 CFR Part 63, Subparts A and DDDDD (Boiler MACT) and the federal CAM rule under 40 CFR Part 64. This emission unit has a control device (baghouse) and potential pre-control emissions of particulate matter greater than the major source threshold level. The CAM monitoring selected for the control device is the existing COMS which was chosen because opacity can be used as a surrogate for PM emissions with appropriate ranges established during PM emissions testing. Additionally, the COMS provides a continuous means of monitoring the process emissions.

Organization and Responsible Individuals

Certain individuals and groups at the facility will have designated responsibilities to ensure that QA/QC activities are performed as required by this QA program. The following is a typical organizational structure of responsibilities.

Operations Supervisor:

- Oversees the CEMS QA/QC program.
- Reviews all plans and reports for accuracy.
- Prepares certification/recertification applications and notifications to required regulatory agencies.
- Stays abreast of EPA regulation updates that may affect the CEMS programs and interprets as required.
- Coordinates and schedules CEMS audits, diagnostic tests and certification/recertification tests as required.
- Reviews the quarterly CEMS reports from each plant prior to submittal.
- Submits quarterly reports and certification/recertification test results to the applicable regulatory agencies.
- Supports and provides training in the administration and maintenance of the CEMS QA program and CEMS Standard Operating Procedures (SOP) documents.
- Reviews CEMS data for validity and makes any necessary corrections so the proper data will be entered in the quarterly reports.
- Ensures records are maintained for out-of-control conditions.
- Notifies the Plant Manager of any abnormal conditions that cannot be resolved within existing CEMS procedures in a reasonable amount of time.
- Maintains files of all plant CEMS data (hardcopy and electronic), reports, calibration gas certificates, etc. for three years as required by the EPA (or as applicable to local regulatory requirements).
- Notifies appropriate plant personnel of scheduled CEMS audits and certification/recertification tests.
- Arranges for support needed by contractor for periodic audits and certification/recertification tests.

- Provides plant resources to assist contractors during audits and certification/recertification testing.

Plant Manager:

- Designates and manages manpower and other resources needed to properly maintain and operate the CEMS.
- Reviews and approves all plant-specific CEMS plans, procedures, and reports.
- Ultimately responsible for ensuring that all routine preventive maintenance is completed on schedule.

Technician or Operator

- Perform the daily checks on CEMS systems.
- Perform regular maintenance on equipment as recommended by each manufacturer.
- Address and report any abnormal conditions to the Plant Manager.
- Make appropriate entries into the maintenance log.
- Maintain the spare parts inventory.
- Maintain calibration gas and audit filter certifications (if applicable).

System Overview

The following figure presents a simplified illustration of CEMS gas flow (reference system drawings for specific component detail). The *Sample probe* extracts a continuous sample of concentrated flue gas. The umbilical *system* transports the extracted sample through a *gas sample conditioner* and then a *gas control panel* distributes the sample to specific *gas analyzers*. The *gas control panel* controls air pressure to the probe purge. The assembly also regulates the flow of calibration gases to the probe during calibration. The *CEMCON* controls the operation and calibration of the CEMS and converts the emissions data for transfer to *CEMDAS*.

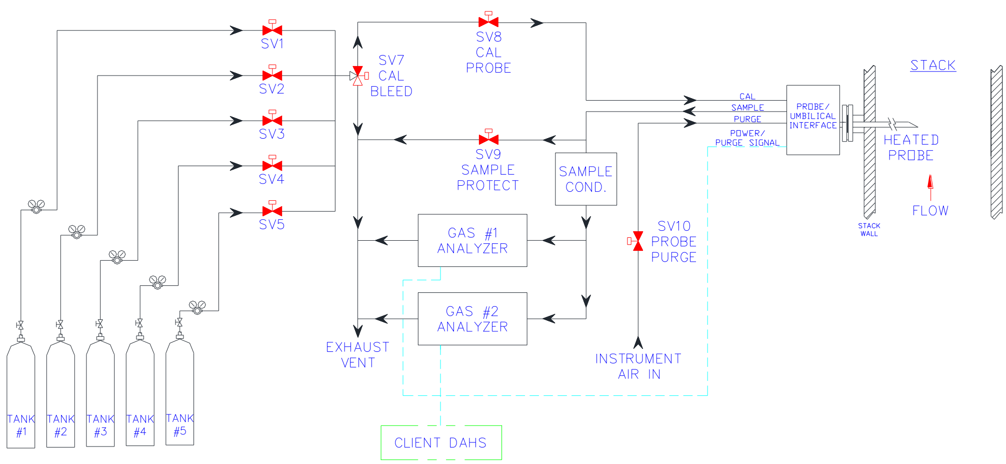


Figure 1. CEMS Overview

The system discussed in this manual consists of the following major interactive subsystems:

CEMS (Continuous Emission Monitoring System) - performs the sampling and measuring of the flue gas. It also generates data in the form of analog or digital signals that are a result of the measurements. Primary components of the CEMS include the gas sampling probe, sample gas conditioner, sample transport umbilical, gas analyzers, and gas control panel.

CEMCON (Continuous Emission Monitoring CONtroller System) receives and stores data generated by CEMS and automatically controls CEMS operations such as system purge, sample air flow, calibration, and detection of alarm conditions. In addition, it provides the communication link between CEMS and CEMDAS. The CEMCON system consists of a PLC controller with power supply and an operator interface.

CEMDAS (Continuous Emission Monitoring Data Acquisition System) retrieves the data stored by the CEMCON and performs the required calculations to determine if the readings are within required limits. The system is designed to provide alarm messages and signals in the event the results do not meet applicable requirements. CEMDAS can also generate the required reports used in EPA audits and in evaluating system operability.

A complete set of operation and maintenance manuals for all components of the system is maintained by the Operations Supervisor. These manuals provide complete descriptions of the system including theory, installation, operation, and maintenance.

Sample Probe

The sample probe performs the extraction of the emission sample from the flue gas flow. The probe is inserted into the gas stream and angled slightly downward. Sample pumps (contained in the sample gas conditioners) extract a gas sample through a filter.

The primary components of the typical probe are: the probe housing where extraction takes place, probe extension, probe heater, thermocouple to monitor temperature, the sample pump, a two (2) micron filter and a small surge tank. The probe extension and heater are constructed of 316L stainless steel.

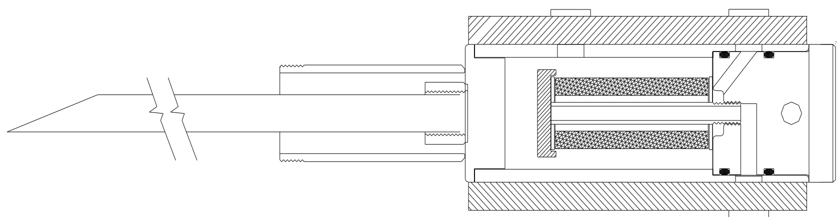


Figure 2. Sample Probe

The Model 34C Heated Filter Probe is designed to be mounted on a stack or duct for use in high particulate applications. Its primary function is to provide a heated environment to maintain sample gas temperatures above dewpoint and remove particulate material from the gas sample. The Model 34C features a standard 2 micron sintered ceramic filter element, an external regulated heater jacket, an integral calibration gas port on both sides of the filter element, a NEMA 4 enclosure, and a single direct blowback system to clean the filter element.

Figure 3. Sample Probe with Stinger

Operation of the sample probe is described in greater detail in the *Baldwin-Series Heated Filter Probes General Purpose Series Model 34C-Monsol Instruction Manual* which is included with the system O&M manual.

Mounting

The Model 34C is designed to be mounted directly on a stack or duct with a 1¼" Schedule 40 male pipe nipple. This pipe nipple can be screwed into a standard ASA flange, either flat or raised face. The probe boot can be heat shrunk to the sample line to eliminate cold spots.

The sample probe will be mounted on a 3-4 degree slope toward the base of the stack to allow moisture to 'run-out'.

Flanging	4" 150# Raised Face-Standard 4" Flat Face - Optional
Probe Stinger Diameter	0.5" (Full Extractive)
Material	316L Stainless Steel
Heater	Maintains probe/filter at 400° F min.
Controller	Heater control with failure alarm and temperature indication
Calibration	Calibration port is designed to insert gas before filter
Filter	2 micron borasilica glass, replaceable without probe removal; changed quarterly. (May also be a 2 micron sintered 316 S.S., replaceable without probe removal. Can be cleaned in an ultrasonic parts cleaner.) 2 micron sintered ceramic, replaceable without probe removal; changed quarterly. May also be a 2 micron borasilica glass or screen type filter. (A stainless steel filter should NOT be used for THC applications.)
Purge System	Accumulator tank for use at a predetermined interval with instrument air. Purge frequency based on process.
Power	120 VAC 60 Hz, Single Phase supplied through the sample umbilical

Blowback (Purge)

The Model 34C comes with a blowback air accumulator tank and 2-way solenoid. To operate blowback, connect a 50-90 psig instrument airline to the blowback air accumulator tank. The customer controls blowback via a PLC or other means determined by customer. The 2-way blowback solenoid is rated high temperature and 100 psig maximum pressure. The valve has a 1/8" orifice and the blowback instantaneous flow rate is 14scfh.

Calibration

To operate calibration gas to the probe, open the user supplied calibration gas control valve, adjust the cylinder pressure not to exceed 35 psig, and adjust the calibration gas flow rate to 125% to 150% of the total gas sample flow rate.

Maintenance Schedule

The typically preventative maintenance required for the probe is to clean or replace the ceramic filter in the probe head. Inspection of all tubing and wiring connections should also be performed. The ceramic filter, o-rings, and blowback solenoid should be considered when determining spare parts requirements.

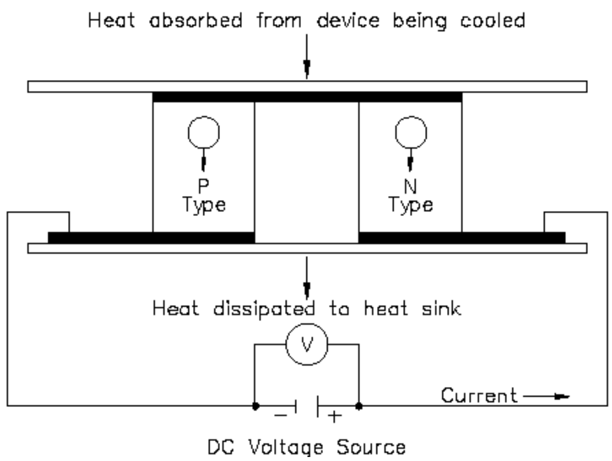
Sample Gas Conditioner

The Perma Pure Model 8210 sample gas conditioner is used to dry and filter the extractive sample of any moisture and other contaminants.

Figure 4. Model 8210 Sample Gas Conditioner

The Heavy Duty Series Thermo-Electric Coolers are specifically designed for high ambient temperature & high water volume applications. The process of sampling stack gas requires a method to remove the moisture from the sample, without removing the gas components of interest.

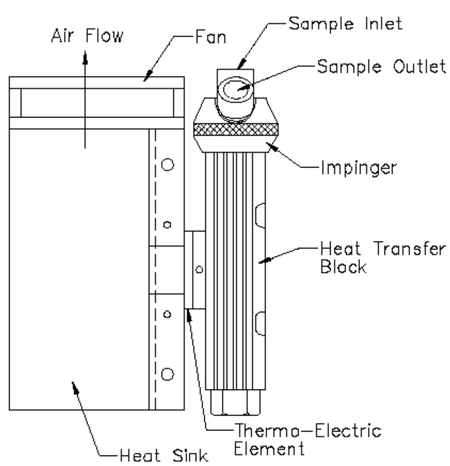
The sample gas is passed to the thermo-electric cooler (to remove moisture) via the heated filter sample probe and heated sample line. The thermo-electric cooler lowers the sample dew point to 5°C (41°F). As the gas cools and the moisture vapor condenses, the condensate exits the heat exchanger through the bottom drain connection. Particulate matter passing through the sample cooler is removed by an optional pre-filter, located downstream from the cooler along with an optional water slip sensor. The conditioned sample gas can then be directed to the gas analyzers.



Thermo-electric element (Peltier)

The coolers use thermo-electric elements (Peltiers) to cool the sample gas to the desired dew point temperature. A thermo-electric cooler is best illustrated as a small heat pump with no moving parts. The Peltiers operate on direct current and may be used for heating or cooling by reversing the direction of current flow. This is achieved by moving heat from one side of the module to the other with current flow and the laws of thermodynamics. A typical single stage Peltier (See Figure) consists of two ceramic plates with p- and n-type semiconductor material (bismuth telluride) between the plates. The elements of semiconductor material are connected electrically in series and thermally in parallel.

When a positive DC voltage is applied to the n-type thermo-electric element, electrons pass from the p- to the n-type thermo-electric element and the cold side temperature will decrease as heat is absorbed. The heat absorption (cooling) is proportional to the current and the number of thermo-electric couples. This heat is transferred to the hot side of the Peltier element where it is dissipated into the heat sink and surrounding environment.



Sample Conditioner Layout

The Thermo-Electric Coolers remove the moisture from the sample gas by cooling the gas as it passes through a laminar impinger (heat exchanger). The heat exchanger, made of 316L stainless steel, Durinert ® (a corrosion-resistant inert coating over 316L stainless steel), PVDF (Kynar), or glass, is mounted within a thermally insulated heat transfer block bored to receive the heat exchanger without a mechanical lock. This assembly allows the easy removal of any heat exchanger simply by slipping it out of the cooling block by hand. The heat transfer block cools the heat exchanger through the heat pumping action of the peltier element. The heat transfer block is on the cold side of the thermo-electric element and the heat sink is on the hot side of the thermo-electric element. The heat from the heat transfer block is pumped to the heat sink where it is then dissipated into the air by the heat sink fan (see figure). The desired temperature is maintained by a closed loop control system, which is implemented through an analog proportional controller.

The controller uses a type K thermocouple in the heat transfer block located very close to the cold side of the peltier element as the input sensor.

The sample gas is passed to the thermo-electric cooler via the heated filter sample probe and heated sample line. The thermo-electric cooler lowers the sample dew point to 5°C (41°F). As the gas cools and the moisture vapor condenses, the condensate exits the heat exchanger through the bottom drain connection. Particulate matter passing through the sample cooler is removed by an optional pre-filter, located downstream from the cooler along with an optional water slip sensor. The conditioned sample gas can then be directed to the gas analyzers.

Maintenance Schedule

The typically preventative maintenance required for the sample conditioner is to clean or replace the ceramic filter, replace the peristaltic pump drain tubing, and service the sample pump (replace the diaphragm and valve) on a quarterly basis or more frequently, if necessary. Inspection of all tubing and wiring connections should also be performed. The ceramic filter, peristaltic tubing, and pump rebuild kit should be considered when determining spare parts requirements.

Umbilical System

The umbilical is a bundle of pneumatic tubes and electrical wires used to interconnect the probe, the gas analyzers and gas transport system. The umbilical is heated to keep it flexible and free of condensation. The umbilical system contains the following lines:

a) One 3/8-in tube for transporting calibration gas to the probe.

b) One 3/8-in tube for transporting sample to the analyzers via the gas control panel and the analyzers.

c) One 3/8-in tube for transporting instrument / purge air to the probe.

Additional components of the umbilical system include the control wiring for the stack J-box, AC voltage for the probe and umbilical heaters, and wiring for the enclosure pressure switch. Two Type "K" thermocouple wires are provided for measuring the temperature of the umbilical and the probe heater. The tube/wire bundle is wrapped in a thermal barrier and is surrounded with thermal insulation. The total umbilical system is enclosed in a flexible fire retardant jacket for protection. The power end is typically marked with yellow tape and the stack end marked with white tape.

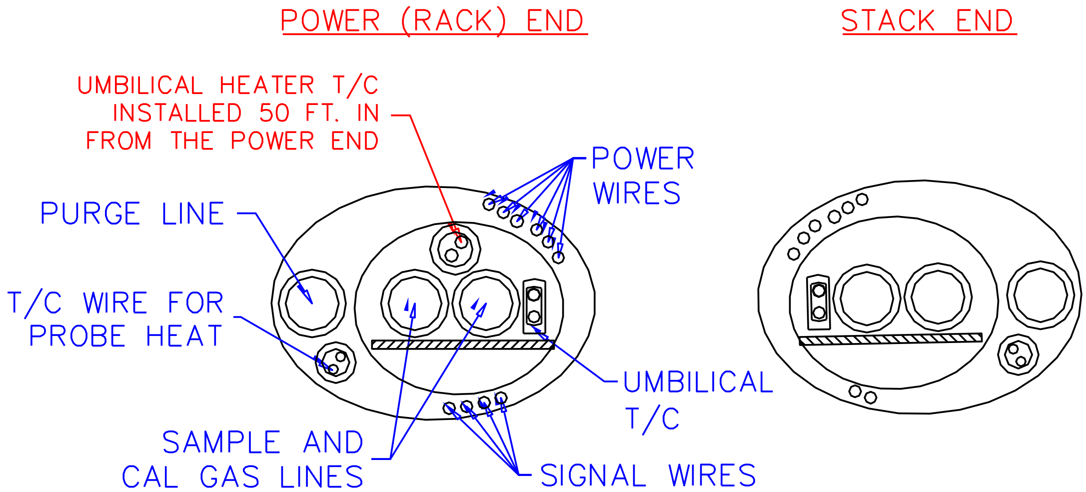


Figure 5. Full Extractive Umbilical

Maintenance Schedule

Preventive maintenance of the umbilical includes a visual inspection of the exterior for any damage or cuts to the outer jacket and any obvious kinking or low spots. Supports should also be considered during the inspection.

Heater Controllers

Figure 6. Auber Temperature Controller

Setup

Temperatures of the umbilical and probe heaters are set by controls located in the system rack.

The umbilical temperature should be set to a point between 275°F and 300°F. If a system is analyzing CO gas emissions, the umbilical temperature setpoint should be set towards the lower end of the range.

The probe temperature setpoint is dependent on the type of probe. The full extractive probe temperature should be set to a point between 300°F and 350°F.

Maintenance Schedule

There is typically no preventative maintenance required for the heater controller assembly. Some systems utilize a solid state relay. Both heater controller and relay should be considered when determining spare parts requirements.

Thermo Electron Corp. Model 42i-HL NO_X Analyzer

Figure 7. TECO Model 42i-HL High Level NOX Analyzer

The NO_X analyzer discussed in the following paragraphs is covered in greater detail by the *Model 42i High Level Chemiluminescence NO-NO_2-NO_X Analyzer Instruction Manual* supplied with this manual. The analyzer is an analytical instrument capable of measuring oxides of nitrogen at levels from 10 to 5000 parts per million. The Model 42i-HL offers fast response time, increased sensitivity, linearity through all ranges, and simplicity of operation. It features a sample pump, independent NO_X ranges, and a replaceable converter cartridge.

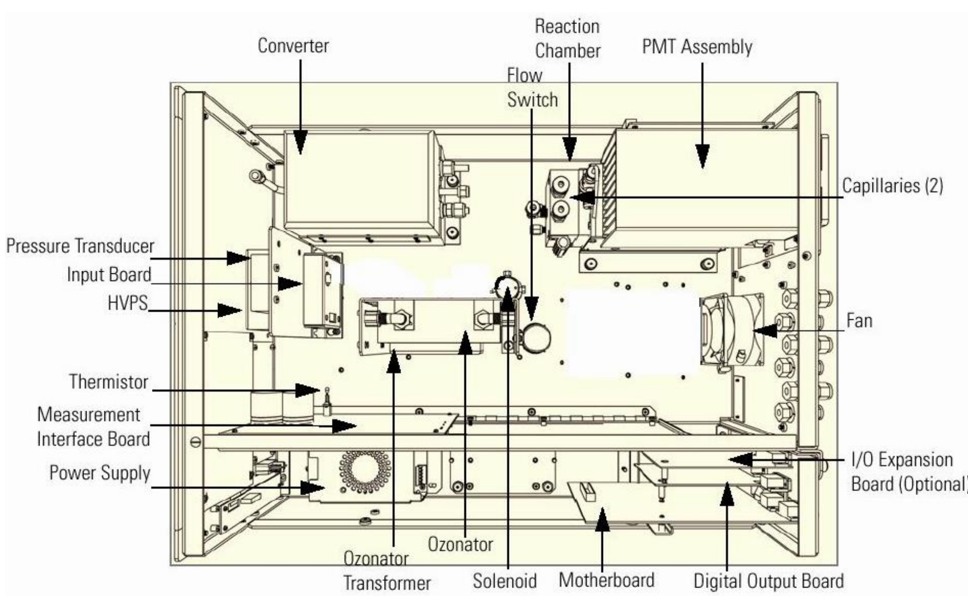


Figure 8. TECO Model 42i-HL NOX Analyzer Component Layout

Principles of Operation

The Model 42i-HL operates on the principle that nitric oxide (NO) and ozone (O_3) react to produce a characteristic luminescence with an intensity linearly proportional to the NO concentration. Infrared light emission results when electronically excited NO_2 molecules decay to lower energy states. Specifically,

$$NO + O_3 \Rightarrow NO_2 + O_2 + hv$$

Nitrogen dioxide (NO_2) must first be transformed into NO before it can be measured using the chemiluminescent reaction. NO_2 is converted to NO by a stainless steel NO_2-to-NO converter heated to about 625°C (the optional molybdenum converter is heated to 325°C).

The ambient air sample is drawn into the Model 42i-HL through the sample bulkhead. The sample flows through a capillary, and then to the mode solenoid valve. The solenoid valve routes the sample either straight to the reaction chamber (NO mode) or through the NO_2-to-NO converter and then to the reaction chamber (NO_X mode). A flow sensor prior to the reaction chamber measures the sample flow.

Dry air enters the Model 42i-HL through the dry air bulkhead, passes through a flow switch, and then through a silent discharge ozonator. The ozonator generates the ozone needed for the chemiluminescent reaction. At the reaction chamber, the ozone reacts with the NO in the sample to produce excited NO_2 molecules. A photomultiplier tube (PMT) housed in a thermoelectric cooler detects the luminescence generated during this reaction. From the reaction chamber, the exhaust travels through the ozone (O_3) converter to the pump, and is released through the vent.

The NO and NO_X concentrations calculated in the NO and NO_X modes are stored in memory. The difference between the concentrations is used to calculate the NO_2 concentration. The Model 42i-HL outputs NO, NO_2 and NO_X concentrations to the front panel display, the analog outputs, and also makes the data available over the serial or Ethernet connection.

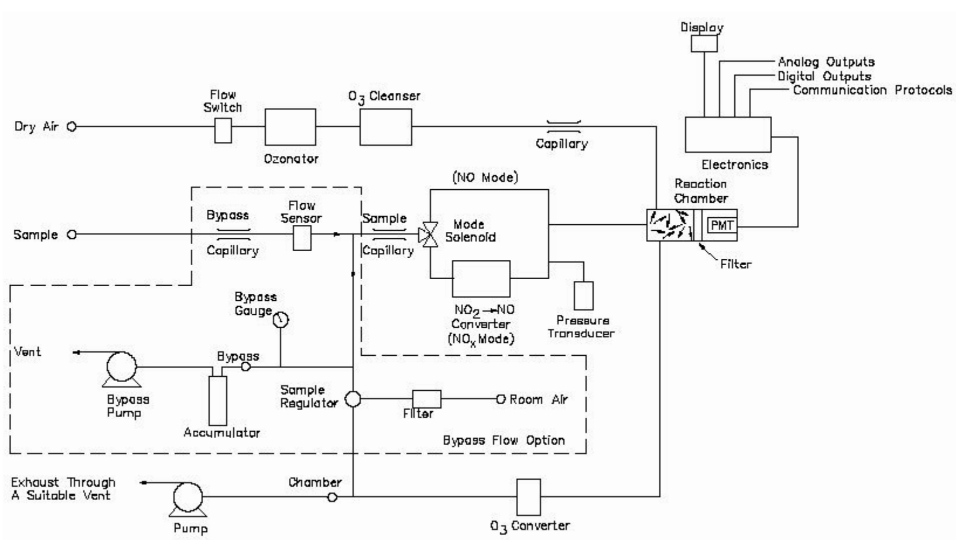


Figure 9. TECO Model 42i-HL NOX Analyzer Flow diagram

The NO_X analyzer discussed in the following paragraphs is covered in greater detail by the *Model 42i High Level Chemiluminescence NO-NO_2-NO_X Analyzer Instruction Manual* supplied with this manual.

Gas Control Panel

Calibration and Purge solenoids

The gas control panel is used to route the calibration gases (both zero air and span gas) to the probe and to regulate the sample flow rate to each analyzer. The sample flow rate is regulated by a flowmeter for each analyzer and should be set to approximately 1.5 lpm for each analyzer. The zero air and the span gas flow are set and monitored by the CALIBRATION GAS flowmeter to approximately 1 lpm above the sum of the analyzer flows when cal to the probe is active.

The switching of the flows of zero, span, and purge gases is performed by solenoids mounted within the solenoid assembly. The high pressure/volume purge is controlled by a purge solenoid located in the stack probe box. High density Teflon tubing is used to interconnect the gas control panel and the solenoids.

Operator Interface Controller

The Operator Interface Controller controls the activation of the calibration and purge solenoids. Two contacts are provided to the client for remote activation of the Daily Calibration Check sequence and the Quarterly CGA sequence. These sequences, as well as activation of individual solenoids, can be performed manually by an operator at the controller.

The frequency and duration of the probe purges is set within the controller. A "First Purge of the Day" purge time is set and subsequent purges occur based on the frequency (in minutes) set in the controller.

Maintenance Schedule

There is typically no maintenance required for the Gas Control Panel, however, the solenoids should be considered when determining spare parts requirements

CEMDAS™ Data Acquisition System

Overview

CEMDAS™ is an automated PC-based data acquisition system custom designed for each client. Its primary functions are the acquisition, processing, storage, and reporting of CEMS data and related information. CEMDAS™ facilitates all of the data reporting requirements necessary to establish compliance with EPA, state, and local operation permit limits. Coupled with a Monitoring Solutions PLC controller, the CEMDAS™ package is a powerful, user-friendly Windows-based system for monitoring, recording, and reporting stack emission information. CEMDAS™ receives analog and status signals from CEMS components such as monitors via the PLC. CEMDAS™ uses these inputs to prepare reports and summarize the data and information derived from the input signals.

Besides the standard reporting features, CEMDAS™ is designed to allow a user to better diagnose and understand their CEMS system. Some of the features include trending, system activity logs, alarm logs, and screen reports.

The typical hardware components included are a Windows-based computer, UPS, monitor, keyboard, mouse, and printer. The specific CEMDAS™ computer configuration is customized for each client and is developed and tested to function with the CEMDAS™ Evolution software.

User Interface

The User Interface (UI) is responsible for providing the user with access to the many features of CEMDAS™. From the UI the user can view real time scan and average data, generate reports, edit system parameters, take monitors out of service, start and stop the flow of calibration gas, and trigger the start of daily or quarterly calibration test cycles.

The typical appearance of the CEMDAS UI is shown below.

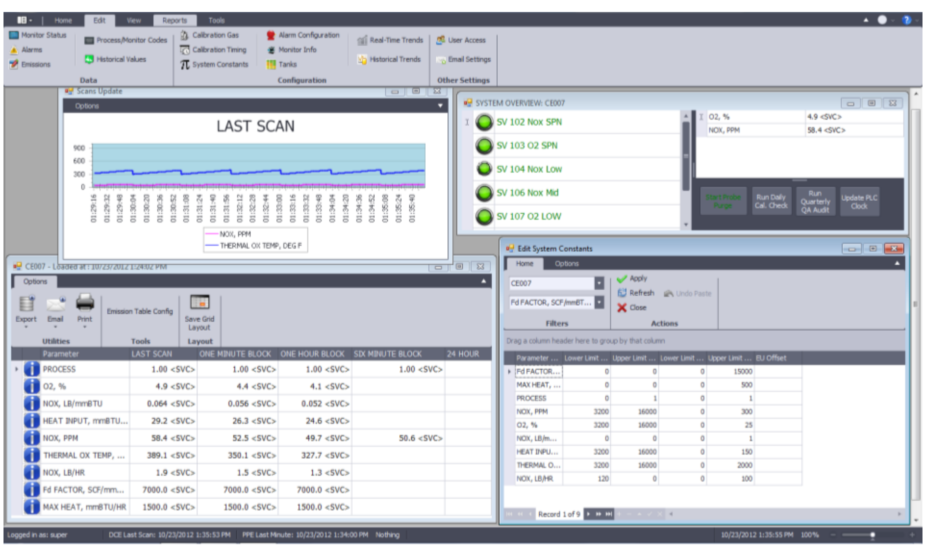


Figure 10. Typical CEMDAS Screen

CEMCON Controller

Programmable Logic Controller (PLC)

CEMDAS™ utilizes a PLC-based CEMCON System Controller, including all necessary I/O. Besides the I/O utilized by the CEMDAS™ software for monitoring and reporting functions, a number of other I/O are available including Digital Inputs, Digital Outputs, Analog Inputs and Analog Outputs.

Maple Systems Model HMI5043L Human Machine Interface

Manual Calibration Checks, as well as purges, can be initiated from the Maple Systems HMI. The HMI allows control of the gas solenoids from the analyzer rack when the CEMDAS™ computer is not located nearby.

Figure 11. Maple Systems Model HMI5043L Operator Interface

CAUTION: Any activity initiated from the HMI unit should be deactivated at the HMI. Switching between the HMI and CEMDAS™ computer may cause the system to fault resulting in a loss of data!

Calibration Overview

During normal operation of the CEMDAS™ Evolution program, the analyzer readings are recorded and displayed on the computer screen for the user to read and evaluate. In order for the readings to be accurate, the analyzers have to be periodically checked with a known standard for comparison. This is done daily per EPA regulations and is known as the "Daily Calibration Check". During the Daily Calibration Check, known values of gases flow to the analyzers and the analyzers' responses are compared to the known values (zero and span gas values are based on federal, state, and local permits). If an analyzers' responses to the known gas values are within tolerances, then the system will continue to operate normally with no action required by the user.

If, during a daily calibration check, an analyzer doesn't read the zero gas or span gas correctly, CEMDAS™ will either indicate a BAD or FAIL status for the calibration on the daily calibration report (typically, ±5% for BAD and ±10% for FAIL). If an analyzer FAILs a daily calibration check, the status of the analyzer will change to MOC (Monitor Out of Control). ***All data collected by CEMDAS™ from this point forward will be considered INVALID for the analyzer that failed its calibration and all data calculated from this analyzer's raw data will also be considered INVALID.***

If the analyzer's response exceeds the permitted limits, the user must take immediate action to bring the analyzer readings back to within limits. Analyzers may have different procedures for performing a manual calibration, but they all must first have the known standard gases flowing to the analyzers so that the analyzers can be calibrated to these known standards.

1) The value of the gas in calibration bottle(s) will vary slightly every time that calibration bottle(s) is changed.

2) Every time a bottle is changed, it is necessary to record the calibration gas value(s) and enter the new value(s) into the CEMDAS™ *Calibration Config* menu.

    - The CEMDAS™ program is compares the analyzer reading with the values entered into the *Calibration Config* menu.

    - If the values in CEMDAS™ are not updated with the new calibration bottle values, the analyzers will read correctly, but the DAILY CALIBRATION REPORT will be incorrect because CEMDAS™ will be comparing with the wrong values.

Calibrations from the System Overview Screen

1) Manually start the flow of calibration gases via the CEMDAS computer.

    a. Access the SYSTEM OVERVIEW screen by selecting the VIEW tab, then selecting System Overview in the ribbon.

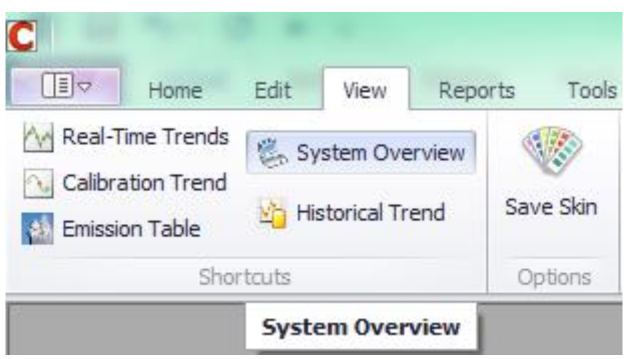


Figure 12. System Overview Select

    b. Once the SYSTEM OVERVIEW screen is open, a graphical representation of the various gas bottles that the system uses will be displayed.

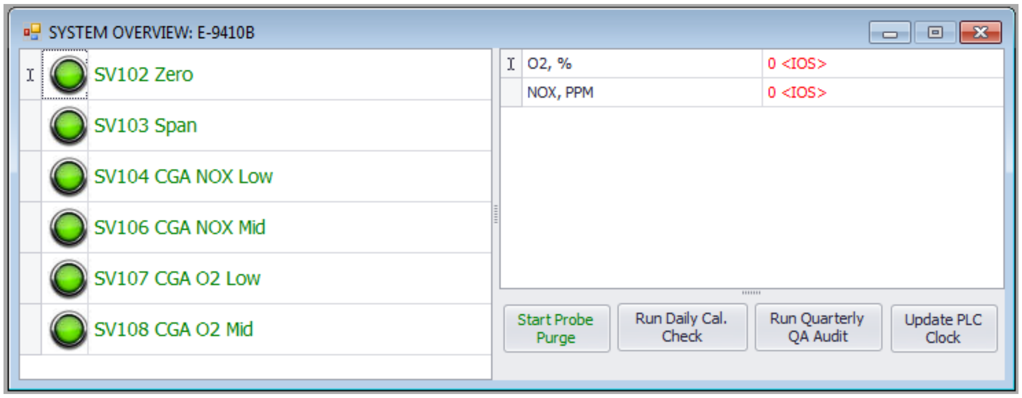


Figure 13. System Overview Screen

c. Each individual gas bottle can be turned on and off from the SYSTEM OVERVIEW screen.

2) Typically, a system will have a ZERO bottle, a DAILY SPAN bottle, a LOW CGA/LIN bottle and a MID CGA/LIN bottle.

a. The exact number of gas bottles in a system, are determined by the type of system and types of analyzers in the system.

b. A system may have more bottles than another system and they may have different labels also.

c. The principles for turning the bottles on and off will be the same regardless of the number of bottles or type of system.

3) Activate a calibration gas bottle.

a. Each bottle will have a green button next to it. Clicking on the green button will bring up a small menu asking if you are sure you want to turn on the selected gas bottle.

b. Select YES to activate the solenoid for that gas bottle and the selected gas will begin flowing to the probe for sampling by the system analyzers.

i. Anytime calibration gases are flowing, the analyzers are no longer sampling stack gases, therefore the readings from the analyzers are not representative of what is in the stack and the status of the analyzers will change from SVC (In Service) to MOS (Monitor Out of Service).

ii. Once YES has been selected and the gas has begun to flow, the button next to the selected bottle will become a red button.

c. Select the red button to turn off the selected gas bottle. A small menu will pop up asking if you are sure you want to turn off the selected gas bottle.

d. Select YES to de-activate the solenoid for that gas bottle and stop the flow of the selected gas to the probe.

   i. The status of the analyzers will change from MOS to NSA (No Sample Available) when the gas flow to the probe is stopped. This is a recovery period, approximately 2 minutes, and allows the system to clear the calibration gases, begin to bring the stack gases down from the probe, and stabilize again so that the analyzer readings are representative of what is in the stack.

   ii. The status will then return to SVC indicating that the data being collected is valid.

Always leave the SYSTEM OVERVIEW screen open while flowing calibration gases from the SYSTEM OVERVIEW screen!

Closing the SYSTEM OVERVIEW screen while a gas bottle is turned on can potentially cause problems, and when the SYSTEM OVERVIEW screen is re-opened to turn the bottles off, the screen will indicate the <u>opposite</u> state of the gas bottle.

Once all gases are turned off, it is safe to close the SYSTEM OVERVIEW screen.

Calibrations from the HMI (Human-Machine Interface)

These general guidelines apply to CEMDAS^{TM} systems utilizing Maple Systems Human-Machine Interface Model HMI5043L touchscreen display unit.

1) Upon power up of the PLC to which the HMI is connected, the first screen to appear after its initialization will display "Monitoring Solutions" and the Date "MM/DD/YYYY" and time "HH:MM:SS".

2) Pressing the Close Screen text at the bottom of any screen will take the user one screen back.

3) Begin by touching the *Press to Login* button. The system options screen will be displayed.

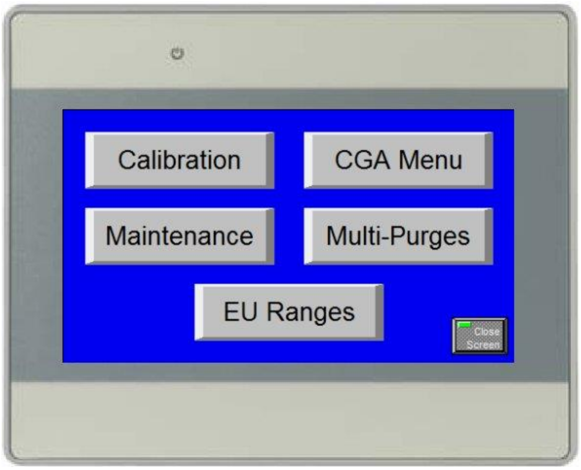


Figure 14. HMI System Options

Manual Calibrations

1) Select the Maintenance button to navigate to the Maintenance Menu. From this menu, a user can manually activate a calibration gas solenoid or purge solenoid(s).

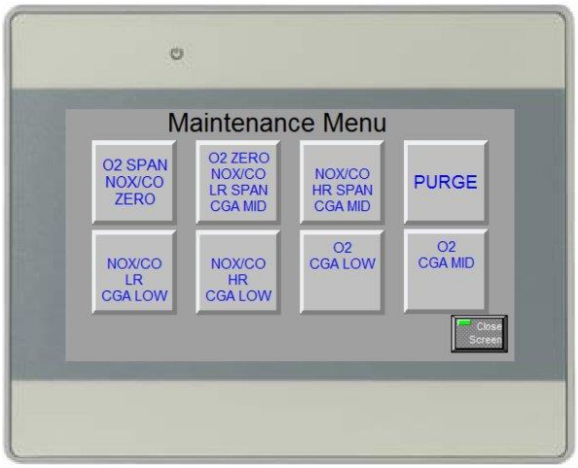


Figure 15. HMI Maintenance Menu

2) Select the desired solenoid. The solenoid activate/deactivate screen will be displayed.

Figure 16. HMI Solenoid Activate Screen

3) A user can toggle the solenoid ON and OFF by pressing the appropriate button. The text and color of the button will switch to correspond to the state of the solenoid. Select the ON button. A click should be heard from the corresponding calibration solenoid, allowing calibration gas to flow from the corresponding gas cylinder.

   a. The *Calibration Gas Rotometer* on the front panel of the analyzer rack allows the gas flow to the corresponding analyzer to be observed and adjusted. The ball in a rotometer indicates gas flow to the analyzer and should be approximately 2 liters/minute for dilution systems and approximately 10-12 liters/minute for full extractive systems.

   CAUTION! All calibration gas bottles toggled ON from the HMI must be toggled OFF from the HMI also. Never turn bottles on from the HMI and attempt to turn off from the CEMDAS OVERVIEW screen or vice versa. ALWAYS TURN BOTTLES ON AND OFF FROM THE SAME LOCATION!

   b. Once the span calibration gas is flowing, allow the analyzers to stabilize for a few minutes so that the calibration gas being sent up to the probe will have time to return back down to the system. This may take a long time if the probe is a very long distance from the analyzer rack. Adjustments and readings may then be taken from the analyzers. (Each analyzer may have different calibration procedures, but will typically involve entering a calibration menu on the analyzer and scrolling to the appropriate screen and forcing the analyzer to output the value of the span calibration gas in the corresponding bottle for its reading.)

4) Once the analyzers are correctly reading the calibration gas, turn off the calibration gas.

Figure 17. HMI Solenoid Deactivate Screen

a. Again, the click of the corresponding solenoid should be heard each time the calibration bottle is toggled on or off.

b. Observe the ball in the *Calibration Gas Rotometer* to verify that calibration gas flow has stopped.

c. It will take approximately 2 minutes for the system to recover and stabilize and for the status of the analyzers to change from NSA to SVC as indicated on the CEMDAS™ *System Overview* screen.

d. In order to activate a different calibration gas bottle, turn OFF the current solenoid. Touch the Close Screen button to go back to the Maintenance Menu.

e. Regardless of whether the calibration gases were manually activated and the analyzers have been calibrated and are reading the calibration gases correctly, if the previous *Automatic* Daily Calibration Check FAILED, the analyzer status will still be MOC.

f. In order to clear the MOC status and return the analyzer(s) status to SVC, the system needs to be run successfully through another *Automatic* Daily Calibration Check.

Automatic Daily Calibration Check cycle

1) From the *System Options* screen, select *Calibration*. This will provide the user with options for manually starting an Automatic Daily Calibration Check cycle.

Figure 18. HMI Calibration Screen

2) Pressing the *Daily* button will initiate a full Automatic Daily Calibration Check cycle.

   a. A Purge will ALWAYS be performed at the end of an Automatic Daily Calibration Check cycle.

   b. A typical sequence would include a Zero check, Span check, and then a Purge. Reference the system drawings for sequence details.

CGA (Cylinder Gas Audit)

1) From the *System Options* screen, select *CGA Menu*. This will display a screen that will allow the user to change the number of CGA runs that will cycle when the CGA is initiated. The typical number of runs is three, however, being able to change the number of runs provides an option for troubleshooting.

Figure 19. HMI CGA Number of Runs Screen

a. Use the Up and Down arrow keys to select the desired number of runs.

b. Once the desired number is displayed, press the *Close Screen* button and the number will be stored.

2) From the *System Options* screen, select *Calibration*. This will provide the user with options for starting a CGA.

a. Pressing the CGA button will initiate a full CGA Calibration Check cycle sequence and will perform the sequence repeatedly based on the number of runs selected in the *CGA Number of Runs* screen. Some systems require a change of cylinders and a second CGA Calibration Check cycle sequence. Reference the system drawings to see if a second sequence is required.

b. Once the CGA is initiated, it ***CANNOT*** be stopped!

Multi-Purges

The system can be setup via the HMI so that a purge is performed multiple times throughout the day.

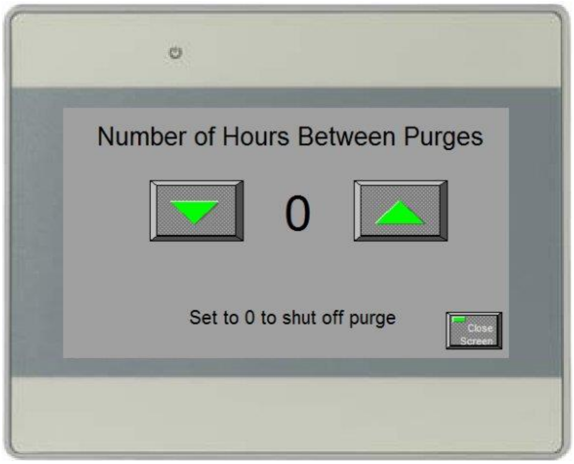


Figure 20. HMI Multi-Purge Setup Screen

1) From the *System Options* screen, select *Multi-Purges*. This will provide the user with options for setting the frequency of the purges.

2) The number that is entered is equal to the number of hours ***BETWEEN*** purges.

> ***CAUTION: If power is lost to the HMI, the purge frequency will return to its default setting upon power up and values will, if previously changed, need to be re-entered.***

DTR (Downtime Recovery) for CEMDAS Evolution

Some systems are equipped with an additional external device that will perform in conjunction with the PLC to store data and provide a utility to recover the data in the event that there are issues with the CEMDAS™ computer. Monitoring Solutions' approach to collecting data when the Computer has lost its connection to the PLC, due to a network problem, the computer being shut down, or a computer failure, is to store as much as 90 days of data in a local storage device located near the PLC. The external device is a Red Lion modular controller with data collection and storage. Data is collected every 2 seconds and stored as a CSV (Comma Separated Variable) type file. The connection between the Red Lion storage device and the PLC will depend on the type of PLC being used and the ports available. In most cases this will be an Ethernet communications. The Red Lion device will communicate with the CEMDAS™ computer via Ethernet communications in all cases.

The CEMDAS™ computer is set up as a time server and as an FTP server. The DTR device will write the data to the CEMDAS™ computer into a subdirectory location of "C:\Cemdas\DTR\logs". A file will be generated for each day. The file will be updated on a periodic basis to the CEMDAS™ computer.

The DTR device will synchronize its time with the CEMDAS™ computer so that the times will match on the two devices. The scan data on the DTR Device will be transferred on a periodic basis from the DTR device to the CEMDAS™ computer DTR subdirectory by the Sync Manager function in the DTR device. If the CEMDAS™ computer has not been communicating with the PLC, the data from the DTR subdirectory will be used to fill in the missing scan Data.

> ***Caution: A user should wait at least 15 minutes after the CEMDAS™ application has been launched prior to performing any down time recovery process to allow for the CEMDAS™ application and the DTR to completely sync any missing data.***

A user must have the proper access rights to initiate the Downtime Recovery process. The following procedure should be followed:

1) Within the CEMDAS™ application, select the *Tools* tab, then select the *Downtime Recovery* option in the menu ribbon.

Figure 21. Downtime Recovery Select

2) The Downtime Recovery window will pop up. The timeframe shown is typically the last timeframe for which CEMDAS™ detected missing data. Select the desired Start Date and Time and the End Date and Time.

> ***Caution: Do not select a timeframe that contains valid data as this may potentially overwrite valid data depending on the reason for the missing data.***
>
> ***Do NOT perform RECALC while the down time recovery process is running.***

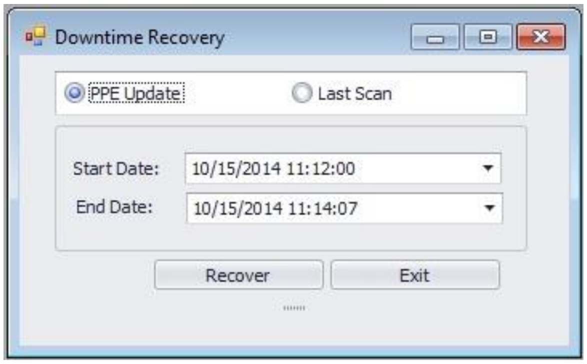


Figure 22. Manual Downtime Recovery Initiate

3) Left click on the Recover button to initiate the process.

   CEMDAS™ will then read in the CSV files data for the period of time selected and perform a conversion of the data from the "raw" CSV file into the appropriate engineering units and status information. During this conversion, any calibration data missed will also be converted and stored into the CEMDAS™ database. All averages will be calculated and the data added to the SQL data bases. This process will take a few minutes. The time required will vary depending on the number of PLC's and the time period for which data must be recovered.

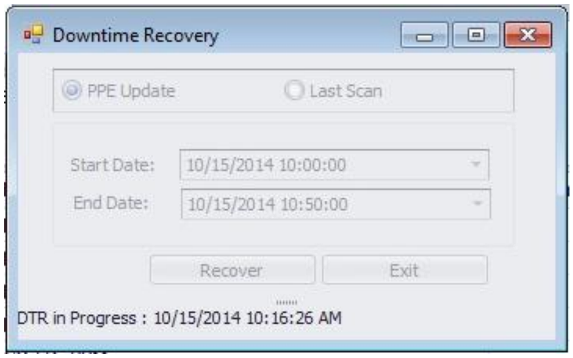


Figure 23. Downtime Recovery In Process

During the recovery time period, there may be a number of alarms generated as CEMDAS™ converts all the data collected during the period the program was not running. All of the alarms will be stored in the CEMDAS™ database for use in reporting.

At the end of the Downtime Recovery process, CEMDAS™ will return to normal operation. The DTR device will also continue to collect data and transfer it to the CEMDAS™ computer for future use when, or if, it is needed.

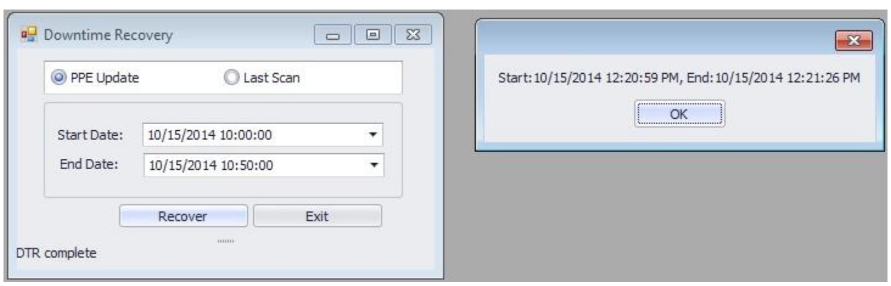


Figure 24. Downtime Recovery Complete

The functions and operation of the CEMDAS™ Evolution program are covered in greater detail by the ***Continuous Emissions Monitoring Data Acquisition System Operation and Manual*** supplied on the CEMDAS™ computer and in the Appendix of the CEMS O&M Manual.

Quality Assurance Activities

Overview

The purpose of these procedures is to ensure that the CEMS installed at the Packaging Corp. - Filer City, MI facility operates in such a manner as to provide accurate and reliable data.

CEMS Analyzer Summary

Table 1. CEMS Analyzer Summary

Measured Parameter	Full Scale Range	Analyzer Mfg	Model
NO_X	0-500ppm	TECO	42i-HL
O_2	0-25%	Brand Gaus	4705

Daily Calibration Drift Check

Calibration Gases

Calibration gases shall be NIST/EPA approved Standard Reference Materials, Certified Reference materials per 40 CFR 60, Appendix F, Section 5.1.2 (3). A separate calibration gas cylinder must be used for each concentration.

Multicomponent mixtures are acceptable provided that none of the components interferes with the analysis of other components and provided that individual components must not react with each other or with the balance gas.

Calibration Error Test for Pollutant and Diluent Monitors – Part 60

Perform a two-point calibration error test on each pollutant and diluent gas monitor at least once per unit operating day (24 hours). A separate calibration gas cylinder must be used for each audit point. The following concentrations must be used:

Table 2. Daily Calibration gas allowable ranges

Audit Level	40 CFR 60
Low-level	0-20% of span
High-level	50-100% of span

Dynamic calibration checks challenging the entire sampling and analysis of the CEMS automatically occur once every 24 hours and are controlled by the PLC. The PLC controls solenoids that open and close to allow low and mid-level calibration gases to be alternately introduced to the pollutant analyzers. Each gas passes through all components used during normal sampling, including the sample probe. Gas is injected until a stable reading is obtained. All analyzer responses during calibration are recorded by CEMDAS Evolution. Calibration gas can be manually initiated at any time.

The results of the CD check are calculated as the measurement device reading minus the value of the calibration gas used.

If a post-maintenance zero or calibration drift checks show drift in excess of twice the applicable performance specifications, recalibration must be conducted in accordance with the quarterly calibration error check procedures.

For CEMS, the zero (low-level) and high-level calibration drifts shall not deviate from the reference value of the calibration gas by more than two times the specification for five consecutive days, or four times the specification for one day.

If a monitor fails a calibration error test, corrective action must be performed and documented, and a successful daily calibration error test performed before data can be considered valid. The CEMS calibration must, as minimum, be adjusted whenever the daily zero (or low-level) CD or the daily high-level CD exceeds two times the limits of the applicable PS. The Monitoring Solutions CEMS Operations and Maintenance Manual provides detailed calibration procedures.

Out-of-Control Period for Pollutant and Diluent Analyzers – Part 60

An out-of-control period occurs for a pollutant or diluent analyzers when the daily low-level or daily mid-level CD exceeds two times the limit for five consecutive days, or four times the limit for one day.

Table 3. Out of Control Limits for Pollutant and Diluent Analyzers

Pollutant or Diluent	Daily Calibration Drift	Out-of Control	
		Five (5) consecutive daily calibrations	Any daily calibration
NO_X	≤ 2.5 % of Span	≥ 5.0 % of Span	≥ 10.0% of Span
O_2	≤ 0.5% by volume	≥ 1% by volume	≥ 2.5% by volume

Monitor adjustments, calibration, or repairs must be performed whenever CD limits are exceeded. The CD check must be repeated after any adjustment or repair. Whenever the CD is exceeded, a warning is displayed on the computer screen and a message is logged to a printable alarm file.

The beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive daily CD check with a failed CD or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a failed CD. The end of the out-of-control period is the time corresponding to the completion of appropriate adjustment and subsequent successful CD check.

Any time the CEMS is declared "out of control" or "out of service", it cannot be used to show compliance with permit limits or data capture requirements and shall be considered downtime for reporting purposes. Therefore, corrective action must be performed as soon as possible after determining that the CEMS is not operating to within required specifications.

Quarterly Audit: CEMS – Pt 60

Conduct the test for calibration error on each range of each measurement device, except for fuel flow meters, in accordance with the procedures in 40CFR60 App. B Performance Specifications.

An audit shall be performed on each pollutant analyzer at least once every calendar quarter in which the source operates for 168 hours or more, except that if four consecutive calendar quarters elapse after the last audit, the test must be performed within 168 source operating hours (If source did not operate at all, the provisions of the Extended outage/Shutdown will apply). Successive quarterly audits shall occur no closer than 2 months.

Calibration Gases – Pt 60

Calibration gases shall comply with per 40 CFR 60, Appendix F, Section 5.1.2 (3). Use audit gases that have been certified by comparison to National Bureau of Standards (NBS) gaseous Standard Reference Materials (SRM's) or NBS/EPA approved gas manufacturer's Certified Reference Materials (CRM's) following EPA Traceability Protocol No. 1. As an alternative to Protocol No. 1 audit gases, CRM's may be used directly as audit gases. A separate calibration gas cylinder must be used for each audit point. The following concentrations must be used:

Table 4. Calibration gas allowable ranges – Part 60

Audit Level	Pollutant Monitors	O2
Low-level	20 - 30 % of span	4-6% by volume
Mid-level	50 - 60 % of span	8-12% by volume

Procedure

The known gases are individually injected at the probe to be sampled through the entire sampling train, as the path used in extracting from the process. Gas is injected until a stable reading is obtained.

The procedure is conducted as follows:

1) Connect all quarterly gas cylinders to the system and turn them on.
2) Verify/Set the corresponding calibration gas cylinder values in the calibration configuration menu in the DAS.
3) Then initiate the sequence by selecting the CGA option on the CEMDAS screen or the OIT.
4) Each gas is routed through the system until a stable response is achieved.
5) Values are recorded as the system is allowed to operate in a normal sampling and analysis manner without adjustment.
6) The sequence is repeated through three audit runs.

For each audit cylinder (or audit point), the percent accuracy is determined by using the following equation:

$$A = \frac{(Cm - Ca)}{Ca} x100$$

Where:

A = Accuracy of CEMS (%)

Cm = Average CEMS response during audit in units of applicable standard or concentration

Ca = Average audit (cylinder gas certified value) in units of applicable standard or concentration

Accuracy (A) value of $\underline{+}$15% or less is considered acceptable for criteria pollutants gas. If excessive inaccuracies occur for two consecutive quarters, Packaging Corp. must revise the QC procedures or modify or replace the CEMS.

Measurements are calculated and recorded by the PLC. The audits serve as verification of the accuracy of the CEMS data. Various reports can be generated to support audits and are kept on file by Packaging Corp.. The manufacturer's certification statement (if applicable) for the calibration gases are also included.

Periodic Audit

Relative Accuracy Test Audit

At least once in every four calendar quarters, conduct a Relative Accuracy Test Audit (RATA), as described in 40 CFR 60, App. B, PS 2, to assess the accuracy of the CEMS relative to the appropriate EPA reference methods used in determining pollutant concentrations. Measured inaccuracy exceeding 20% of the mean value of the reference method results or 10% of the applicable standard, whichever is greater, requires corrective action to be taken. When appropriate, additional audits are conducted to demonstrate the effectiveness of the repair or adjustment.

RATA Preparation

A number of quality assurance activities are undertaken before, during, and after each audit. The following paragraphs detail the quality control techniques, which are rigorously followed during the testing projects.

Each instrument's response is checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity is checked by first adjusting its zero and span responses to the zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response is then challenged with other calibration gases of known concentrations and accepted as being linear if the response of the other calibration gases agreed within ±2 percent of range of the predicted value.

After each test run, the analyzers are checked for zero and span drift. This allows each test run to be bracketed by calibrations and documents the precision of the data just collected. Data is considered acceptable if the instrument drift is no more than 3 percent of the full-scale response. Quality assurance worksheets are prepared to document the multipoint calibration checks and zero and span checked performed during the tests.

The sampling systems are leak checked by demonstrating that a vacuum greater than 10 in Hg could be held for at least 1 minute with a decline of less than 1 in Hg. A leak test is conducted after the sample system is set up and before the system is dismantled. These checks are performed to ensure that ambient air has not diluted the sample. Any leakage detected prior to the tests would be repaired and another leak check conducted before testing commenced.

The absence of leaks in the sampling system is also verified by a sampling system bias check. The sampling system's integrity is tested by comparing the responses of the analyzers to the calibration gases introduced via two paths. The first path is directly into the analyzer and the second path via a sample system at the sample probe. Any difference in the instrument responses by these two methods is attributed to sampling system bias or leakage. The criteria for acceptance is agreement within 5% of the span of the analyzer.

RATA Activities - CEMS

1) Verify that all plant operations will be normal (e.g., no scheduled maintenance) and that no other condition exists which could prevent testing emissions under representative operating conditions.
2) Verify the availability of all personnel required to perform testing.
3) Verify that test location conditions are adequate for testing, and that necessary support services are available.
4) Verify that all scheduled maintenance on the CEMS has been performed.
5) Perform the following procedures immediately prior to, during, and following RATA testing:
6) Perform and document a pre-test calibration of the CEMS.
7) Notify appropriate levels of management of testing.
8) Verify CEMS operating conditions are normal by conducting walk-through audits.
9) Verify load remains stable and at least 50% of maximum prior to, and during, testing.
10) Perform and document a post-test calibration of the CEMS.

Quality Control Activities

Quality control activities are performed to ensure that the CEMS operation and maintenance are adequate and appropriate. Application of these activities ranges from installation to data handling and reporting procedures. Quality control activities rely upon a qualified and well-trained staff.

Installation of the CEMS has been carried out in strict accordance with specifications submitted by Packaging Corp.. A complete set of Operation and Maintenance manuals for all components of the CEMS are provided with the CEMS. These manuals provide complete descriptions of the system including theory, installation, operation and maintenance including procedures used for initial start-up, debugging, and inspection.

Training

Training is an essential element of a successful QA/QC program. It provides the basic knowledge required to accomplish a procedure correctly. Training also provides an understanding in a given task or procedure, thereby enabling the individual involved to make effective decisions. Training is the framework about which activities are performed in a consistent manner regardless of who completes them.

General Training

General training may be viewed as providing a foundation. It is not intended as much to deliver detailed and specific knowledge, as it is to provide an understanding of the overall system and program goals. General training is common to all individuals directly involved in the CEMS program.

Quality Assurance/Quality Control Plan

Each source owner or operator must develop and implement a QC program. As a minimum, each QC program must include written procedures which should describe in detail, complete, step-by-step procedures and operations for each of the following activities:

1) Calibration of CEMS.
2) CD determination and adjustment of CEMS.
3) Preventive maintenance of CEMS (including spare parts inventory).
4) Data recording, calculations, and reporting.
5) Accuracy audit procedures including sampling and analysis methods.
6) Program of corrective action for malfunctioning CEMS.
7) Clients must develop and have an approved QA/QC procedure for their COMS. The QA/QC procedure must have a corrective action program for a COMS system that is malfunctioning. The corrective action program must address routine and/or preventative maintenance and various types of analyzer repairs. The corrective action program must establish what type of diagnostic testing must be performed after each type of activity to ensure the COMS is collecting valid data.

All employees involved in the CEMS program must read this QA/QC Plan.

Standard Operating Procedures

As with the QA Plan, all affected employees must, at a minimum, be familiar with and review appropriate SOP's as they are developed with experience.

Periodic and Refresher Training

Special and refresher training is presented annually. Each affected employee receives appropriate training as SOP's, operating parameters, or as personnel changes are made.

Record Keeping

The Operations Supervisor will be responsible for training as the need arises. Training records are maintained for each affected employee.

QC Activities

An activity matrix summarizing various routine recommended maintenance activities is presented in the following tables.

Activity: Quality Control	Daily	Quarterly	As Required
DAS Alarms Status	X		
Analyzer Alarms Status	X		
Zero Value Cal Check Passed/Record	X		
Span Value Cal Check Passed/Record	X		
Calibration gas cylinder(s) >250psi	X		
Walk-through Audit		X	
Clean/Replace Filters - Analyzers		X	
Clean/Inspect Sample Conditioner		X	
Replace/Clean Filters - Probe		X	
Change Air System Filters/Scrubbers		X	X
Clean Interior of Enclosure/Rack		X	X
Printer Maintenance			X

Daily Activities

Once every day, the Maintenance Personnel will:

1) Verify that the Pollutant and Diluent Daily Calibration checks have PASSED and that the zero and span calibration values are recorded in CEMDAS.

2) Verify that the calibration cylinders have pressures greater than 250psi and the certifications have not expired.

3) Check/address any CEMDAS/analyzer/monitor alarms. If any parameter is found to be out of tolerance, appropriate corrective actions will be initiated promptly.

Quarterly Activities

1) Perform Walk-through Audit

   The walk-through audit involves a general inspection of the monitoring system. The walk-through audit is used to provide a quick assessment of the availability of data, general effectiveness of operation and maintenance, and the completeness of record keeping procedures.

   The walk-through audit is conducted at least once every quarter and is documented on a walk-through audit sheet.

   Prior to performing any scheduled maintenance on the CEMS, the Maintenance Personnel (or a hired contractor) will notify the Plant Manager so that any necessary steps can be taken to adjust the process, so as to not cause any excess air emissions during the scheduled maintenance.

   The Walk-Through Audit involves the following (May be completed by contractor):

2) Administrative

   a. Maintenance logs - Check for timeliness of work, completion of entries.

   b. Record keeping - Check that all records are available and complete.

   c. Data system - Verify correct span values entered.

   d. Check maintenance logs for timely and complete repairs.

   e. Ensure all maintenance log entries are current and contain all maintenance performed.

3) Technical

   a. Check that printer and strip chart recorder are operational, output is legible, and readings consistent with process conditions.

   b. Check that shelter cabinets are clean and the area maintained; monitor enclosure clean and all systems operational (i.e., heating/cooling).

   c. Check computer disc drive and clean as necessary.

   d. Clean/Replace sample inlet filters on all analyzers. Clean the analyzer screens.

   e. Clean/Inspect sample conditioner. Check the filter bowl for excess moisture. Replace the peristaltic tubing.

   f. Clean/Replace filter on the sample probe.

   g. Replace filter elements and scrubbers on the air clean up system.

CEMS Maintenance

All maintenance of the CEMS can be classified into one of these three areas:

1) Routine preventive maintenance. This is a regularly scheduled set of activities designed to prevent problems before they develop.

2) Non-routine preventive maintenance. This set of activities is designed to prevent problems, which cannot be predicted. These procedures are performed on an as-needed basis. For example, if sample vacuum on the analyzer drops from its normal reading, the pump, gauge or sample capillaries should be replaced or cleaned. Non-routine preventive maintenance is not discussed in this plan since the procedural methods must be developed as the need dictates.

3) Corrective Maintenance. Those activities required to correct problems that occur due to equipment malfunction. Corrective maintenance actions are determined and performed by the Monitoring Solutions maintenance technician or other qualified personnel based on the nature of the malfunction.

All preventive maintenance is scheduled and performed in a timely manner by the Operations Supervisor.

Spare Parts Inventory

The Technician or Operator will:

1) Maintain a spare parts inventory adequate to meet the normal operating requirements.

2) Maintain the spare parts inventory based on vendor recommended lists.

3) Modify the current inventory on an "as required" basis.

A list of the parts recommended to adequately maintain the normal operating requirements of the CEMS is located in the *Monitoring Solutions CEMS Operations and Maintenance Manual*. Contact Monitoring Solutions at (317) 856-9400, fax (317) 856-9410 for information on pricing and availability.

Data Recording and Reporting

General Requirements

An effective quality assurance program communicates the results of QA/QC activities to all affected parties. This QA plan makes provisions for the proper recording and communication of QA and QC information and provides the necessary mechanisms for triggering corrective actions based on the contents of QA/QC reports.

Documentation of QA/QC data and information is an integral part of this QA Plan. This section describes reports and other records that provide appropriate documentation of QA/QC activities. Packaging Corp. utilizes two primary means of documentation:

1) Data Acquisition System - CEMDAS Evolution

2) Manually prepared QA/QC forms, logs and reports.

All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the renewable operating permit.

All reporting is to be on an Eastern Standard Time basis.

The data acquisition system must be capable of reading all values over the full range of each measurement device and must create a permanent record of all required raw and calculated data for storage, review and reporting. In addition, a continuous readout in units of each applicable emission standard or operating criteria is required.

Notification, Reporting and Record Keeping requirements

1) In the event of any malfunction or breakdown of process or emission control equipment for a period of four hours or more which results in increased emissions, the owner or operator shall submit a written report which describes the cause of the breakdown, the corrective actions taken, and the plans to prevent future occurrences. This report must be submitted by means that would insure the District Office's receipt of the report by no later than seven days after the occurrence. The information submitted shall be adequate to allow the District Office to determine if the increased emissions were due to a sudden and unavoidable breakdown. Such a report shall in no way serve to excuse, otherwise justify or in any manner affect any potential liability or enforcement action.

2) Packaging Corp. shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of an affected facility, any malfunction of the air pollution control equipment or any periods during which a continuous monitoring system or monitoring device is inoperative.

3) Packaging Corp. shall submit a written report postmarked within 30 days after the semiannual period as prescribed by the District Office semiannual. The semiannual periods shall cover the periods of January 1 to June 30 and July 1 to December 31. The report shall contain as a minimum, the following:

   a) The nature and cause of the deviation, the time and date of occurrences, and any initial and final corrective action taken.

   b) A summary of any days for which any of the required operation and maintenance surveillance checks were not made and the reason for such failure to perform the surveillance.

   c) Any corrective actions taken to prevent any further deviations.

Maintenance Record

The Maintenance Record is maintained by the Operations Supervisor, who enters descriptions of preventive and remedial actions performed on the monitoring system components. These entries are kept in the maintenance files. This record also documents the use of spare parts. A periodic review of the CEMS maintenance record provides a guide to possible problem trends with the CEMS and input as to the needs of the spare parts inventory.

CEMDAS Evolution records an Alarm/Message at the time of the alarm to provide a real-time mechanism for alerting operating personnel to excess emissions and monitoring system problems. When alarm messages are received, Plant Operations personnel advise the Operations Supervisor and appropriate inspection/maintenance activities are initiated. The alarm/message provides for automated and also manually entered documentation of the CEMS operating status during alarm conditions.

Component Addition, Maintenance or Replacement

Maintenance

1) Zero and calibration drift checks should be conducted immediately prior to any maintenance, if possible.

2) Zero and calibration drift checks must be conducted immediately following any maintenance.

3) If the post-maintenance zero or calibration drift checks show drift in excess of twice the applicable performance specifications, recalibration must be conducted in accordance with the quarterly calibration error check procedures.

Addition or Replacement

Scheduled addition of or replacement of components or software programs with components or software programs of different makes or models requires submittal of the record of proposed maintenance prior to such change. For unscheduled addition of or replacement of components or software programs with components or software programs of different makes or models, submittal of the record of conducted maintenance must be made as soon as possible after such replacement. Successful completion of performance testing may be required prior to use of data from the monitoring system. Contact the Department for specific instructions.

Addition of or replacement of components or software programs with like makes and models may require successful completion of performance testing prior to use of data from the monitoring system. Contact the Department for specific instructions.

Troubleshooting

Recommended troubleshooting procedures are located in the *Monitoring Solutions CEMS Operations and Maintenance Manual*. Contact Monitoring Solutions at (317) 856-9400, fax (317) 856-9410 for service and parts.

Glossary of Terms and Acronyms

A-B	Family of Programmable Logic Controllers used in the CEMCON. Manufactured by Allen-Bradley Products.
Accuracy	The measure of the closeness of a measurement to its true value. Although the true value of gas is not known, it can be approximated by the use of an appropriate standard of reference. For example, a National Institute of Standard and Technology Standard (formerly NBS) Reference Material (NIST-SRM) is a primary standard used to assess accuracy. Secondary standards are also used as an approximation to the "true value" although errors may be introduced using these secondary standards.
Analyzer	Instrument that measures concentration of a specific gas - such as CO_2, CO, O_2, NO_X, or SO_2 - in a flue gas sample.
ANSI	American National Standards Institute - a standards-making organization.
ASTM	American Society for Testing and Materials
Audit	An audit is an independent assessment of the accuracy of data. Independence is achieved by having the audit performed by an operator other than the person conducting the routine measurements and by using audit standards and procedures different from those routinely used in the monitoring.
CAI	California Analytical Instruments. Manufacturer of the NOx, CO, CO2, and THC analyzers in the CEMS
Calibration Drift (CD)	The difference in the CEMS output reading from a reference value after a period of operating during which no unscheduled maintenance, repair, or adjustment took place. For opacity, the reference value is supplied by a reflecting mirror and a neutral density filter or screen which can be automatically or manually inserted into the light beam path of the monitor. For pollutant analyzers, the reference value is supplied by injecting gases of known values into the system. The CD error is calculated as the difference between the correct value and the observed value for the zero and upscale calibration value.
Calibration Error Test (CE)	A calibration error test is a performance audit of a CEMS in which a three point audit is conducted. For opacity, three certified neutral density filters (low, mid, and high-range) are placed in the monitor light beam five nonconsecutive times and the monitor responses are recorded from the opacity data recorder. For CEMS analyzers, three known reference gases are used. From the data, a calibration error is calculated.
cc	cubic centimeter - A unit measure of volume equal to 1 milliliter (ml).

Carulite	Scrubbing media used in the Air Clean Up system to filter Carbon Monoxide. Should always be placed after a drying media, such as Drierite, as moisture will damage the scrubbing media.
CEMCON	CEM Controller - A sub system that provides control logic for numerous activities, including daily automatic calibration error check and quarterly cylinder gas audit. The CEMCON collects and passes test data to the CEMDAS for processing.
CEMDAS	Continuous Emissions Monitoring Data Acquisition System.
CEMS	Continuous Emissions Monitoring System. The total equipment required for the determination of pollutant gas concentrations, flow, or opacity on a continuous basis.
CFR	Code of Federal Regulations. The CEMS is designed to help the user meet their applicable requirements.
CGA	Cylinder Gas Audit.
chip	Integrated Circuit - a microelectronic semiconductor device.
CU	Count Units – The scaling factor used by a DAS to coincide the analog input/output signal with the engineering units or range.
DAS	Data Acquisition System - a shortened version of CEMDAS.
DIP Switch	A group of subminiature switches, usually slide switches, housed in a Dual In-line Package (integrated circuit header) configuration.
Drierite	Indicating granular silica gel desiccant used as a dryer in the air cleanup units.
DTR	Down Time Recovery – Refers to the process of recovering data lost to the main CEMDAS computer via means of a backup or secondary collection method.
Flue Gas	The gas produced as a result of combustion or some other industrial process. The gas may be made up of multiple components such as particulate matter, liquids, condensed solids, vapors, and gases. The flue gas may also be referred to as: stack gas, duct gas or smoke.
EPA	Environmental Protection Agency; regulating body that oversees and controls environmental issues.
EU	Engineering Units
FET	Field Effect Transistor - an active three terminal semiconductor device.
HMI	Human Machine Interface – Operator interface typically mounted at the equipment location to assist in maintenance activities. See also MDU.

In Hg	Inches of mercury, a unit measure of pressure (One atmosphere = 14.696 psi = 0 psig = 29.921 in Hg = 406.8 in WC).
In WC	in H_2O, Inches of Water (Column), a unit measure of pressure. See In Hg, above.
LED	Light Emitting Diode - a solid state miniature indicator light.
LPM (l/min)	Liters per minute
Maple	See MDU
MDU	Message Display Unit (Maple) - The operator interface panel on the CEMCON PLC. Manufactured by Maple Systems, Inc.
Millivolt (mv)	An electrical unit of measure equal to 1 x 10^{-3} volt.
MMBtu	One million Btus.
Monitor	Instrument that measures a flue gas characteristic such as opacity or flow.
Monitor Malfunction	Any interruption in the collection of data as a result of the failure of any component of the CEMS to operate within specifications of the manufacturer or Performance Specification.
MSDS	Material Safety Data Sheet - Standardized format sheet containing health, safety, fire, first aid, chemical properties and other necessary information supplied by manufacturer of hazardous materials.
Nanometer (nm)	A unit measure of length equal to 1 x 10^{-9} meter. Commonly used to describe wavelengths of light.
NBS	National Bureau of Standards - an agency of the US government chartered to maintain standards of measurement.
NEMA	National Electrical Manufacturers Association - a standards-making organization. CEMS enclosures (e.g., junction boxes, instrument racks, switch boxes, etc.) are rated by their manufacturers to meet various NEMA standards.
NO_X	Oxides of Nitrogen
OIT	Operator Interface Terminal
OSHA	Occupational Safety and Health Administration.
Out-Of-Control Period	The time period which the CEMS may not be collecting valid data; or data which may not be used to demonstrate compliance.

Performance Audit	A quantitative evaluation of CEMS operation. Usually the accuracy of the CEMS is determined by using known reference standard.
PLC	Programmable Logic Controller - the heart of the CEMCON.
PMT	Photomultiplier Tube - an electronic device used to convert light energy into electrical energy. In the CEMS, a PMT is used in the Model 42i series Analyzer to measure NO_X concentration.
Pot	Potentiometer, a 3-terminal variable resistor. Position of sliding contact can be adjusted by rotating a shaft or screw or by sliding a control tab or knob. Miniature screw-adjusted units are commonly called trimpots; multi-turn knob-adjusted units are called helipots; linear-adjusted units are called slidepots.
PPM (or ppm)	Parts per million, a measure of concentration (1000 ppm = 0.1%).
psi	Pounds per square inch - a unit of measure of pressure.
psia	Pounds per square inch absolute.
psig	Pounds per square inch gauge.
psiv	Pounds per square inch vacuum.
Purafil	An expendable material used in the Monitoring Solutions Air Clean-Up System as a scrubber for SO_2 and NO_X.
QA/QC	Quality Assurance/Quality Control
RATA	Relative Accuracy Test Audit (performed semi-annually or annually, depending on results from the previous RATA).
Routine Maintenance	An orderly program of actions designed to prevent the failure of monitoring parts and systems during their use.
SOP	Standard Operating Procedure.
Span (Daily)	Refer to Upscale Calibration Value.
ss (or SS)	Stainless steel - Standard abbreviation is CRES (Cold Rolled Electroless Steel).
Systems Audit	A qualitative evaluation of CEMS Operation. Emissions data, logs, QA/QC data and the operational information are reviewed by regulator officials or by a corporate environmental auditor in order to determine the operational status of the CEMS relative to the applicable regulations or to the company's objectives.

Upscale Calibration Value	Sometimes referred to as the span or daily span. The calibration check of the CEMS is performed by simulating an upscale condition. For pollutants and diluents, the upscale value is simulated with a calibration gas. For opacity, the upscale calibration value is simulated with a calibrated filter or screen.
Zero	A simulated or actual level where the system value is at zero (0) percent. For opacity, a simulated zero is initiated daily when a mirror in the transceiver unit moves into the light path. An actual zero may be performed when the opacity is mounted on the stack and no emissions are in the stack or duct (clean stack conditions) or by removing the opacity (transceiver and retro reflector) from the stack to achieve the actual zero. For CEMS analyzers, zero is simulated using known standards, typically calibration gases, where the value is at zero (0).

Attachments

Attachment 1. CEMDAS Minute Report sample printout

CLIENT | **Minute Report** | Created on : Apr 07, 2016 15:03:20

LOCATION | 04/07/2016 07:00 - 04/07/2016 15:02 | UNIT

04/07/2016	Fc FACTOR, SCF/mmBTU	DIESEL Hc, BTU/GAL	PROCESS	NOX LR, PPM	NOX HR, PPM	CO LR, PPM	CO HR, PPM
07							
07:00:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:01:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:02:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:03:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:04:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:05:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:06:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:07:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:08:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:09:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:10:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:11:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:12:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:13:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:14:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:15:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:16:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.3 MOC	0.0 MOC	0.0 MOC
07:17:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:18:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:19:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:20:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:21:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:22:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:23:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:24:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:25:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:26:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:27:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:28:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:29:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC
07:30:00	1420.0 SVC	128488.0 SVC	0.0 UNO	0.1 MOC	1.4 MOC	0.0 MOC	0.0 MOC

Status Code Definitions

MOC = MONITOR OUT OF CONTROL   SVC = MONITOR IN SERVICE   UNO = UNIT NOT OPERATING

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Attachment 2. CEMDAS Emissions sample printout

CLIENT | **Emissions Report** | Created on : Apr 07, 2016 15:04:43

LOCATION | 04/04/2016 00:00 - 04/07/2016 15:00 | UNIT

04/07/2016	Fc FACTOR, SCF/mmBTU		DIESEL Hc, BTU/GAL		PROCESS		NOX LR, PPM		NOX HR, PPM		CO LR, PPM		CO HR, PPM	
00:00	1420.0	SVC	128488.0	SVC	0.0	UNO	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
01:00	1420.0	SVC	128488.0	SVC	0.0	UNO	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
02:00	1420.0	SVC	128488.0	SVC	0.0	UNO	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
03:00	1420.0	SVC	128488.0	SVC	0.0	UNO	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
04:00	1420.0	SVC	128488.0	SVC	0.0	UNO	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
05:00	1420.0	SVC	128488.0	SVC	0.0	UNO	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
06:00	1420.0	SVC	128488.0	SVC	0.0	UNO	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
07:00	1420.0	SVC	128488.0	SVC	0.3	SVC	0.1	MOC	1.3	MOC	0.0	MOC	0.0	MOC
08:00	1420.0	SVC	128488.0	SVC	1.0	SVC	0.3	MOC	1.3	MOC	0.1	MOC	0.9	MOC
09:00	1420.0	SVC	128488.0	SVC	1.0	SVC	0.6	MOC	1.2	MOC	0.3	MOC	2.1	MOC
10:00	1420.0	SVC	128488.0	SVC	1.0	SVC	289.0	NSA	1732.3	NSA	115.5	NSA	1731.8	NSA
11:00	1420.0	SVC	128488.0	SVC	1.0	SVC	289.0	SVC	1732.3	SVC	115.5	SVC	1731.8	SVC
12:00	1420.0	SVC	128488.0	SVC	1.0	SVC	289.0	SVC	1732.3	SVC	115.5	SVC	1731.8	SVC
13:00	1420.0	SVC	128488.0	SVC	1.0	SVC	289.8	SVC	1734.9	SVC	109.5	SVC	1734.3	SVC
14:00	1420.0	SVC	128488.0	SVC	1.0	SVC	289.8	SVC	1734.9	SVC	109.5	SVC	1734.3	SVC

Totals:	11360.0	1027904.0	7.3	1157.6	6934.4	450.0	6932.2
Maximum:	1420.0	128488.0	1.0	289.8	1734.9	115.5	1734.3
Minimum:	1420.0	128488.0	0.3	289.0	1732.3	109.5	1731.8
Average:	1420.0	128488.0	0.9	289.4	1733.6	112.5	1733.1
Valid / Oper hrs:	8 / 8	8 / 8	8 / 8	4 / 8	4 / 8	4 / 8	4 / 8

Status Code Definitions

MOC = MONITOR OUT OF CONTROL   NSA = NO SAMPLE AVAILABLE   SVC = MONITOR IN SERVICE

UNO = UNIT NOT OPERATING

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Attachment 3. CEMDAS Daily Calibration Report Sample Printout

CLIENT | **Calibration Report** | Created on : Apr 07, 2016 12:48:08

LOCATION | 04/07/2016 - 04/07/2016 | UNIT

Date	Timestamp	Parameter	Type	Measured	Expected	Error	Result
04/07/2016							
	06:19:02	CO HR, PPM	Zero	0.4	0.0	0.0	Pass
	06:19:02	CO LR, PPM	Zero	-1.9	0.0	1.0	Pass
	06:19:02	CO2, %	Zero	0.1	0.0	0.1	Pass
	06:19:02	NOX HR, PPM	Zero	-1.9	0.0	0.1	Pass
	06:19:02	NOX LR, PPM	Zero	-0.4	0.0	0.1	Pass
	06:23:01	CO LR, PPM	Span	-2.0	111.0	56.5	Fail
	06:23:01	NOX LR, PPM	Span	-0.3	275.7	55.2	Fail
	06:27:03	CO HR, PPM	Span	0.4	1,658.0	55.3	Fail
	06:27:03	CO2, %	Span	0.1	12.1	12.0	Fail
	06:27:03	NOX HR, PPM	Span	-2.0	1,693.0	56.5	Fail
	10:56:07	CO HR, PPM	Zero	6.7	0.0	0.2	Pass
	10:56:07	CO LR, PPM	Zero	0.4	0.0	0.2	Pass
	10:56:07	CO2, %	Zero	0.0	0.0	0.0	Pass
	10:56:07	NOX HR, PPM	Zero	6.4	0.0	0.2	Pass
	10:56:07	NOX LR, PPM	Zero	1.1	0.0	0.2	Pass
	11:00:06	CO LR, PPM	Span	115.5	116.2	0.4	Pass
	11:00:06	NOX LR, PPM	Span	289.0	291.1	0.4	Pass
	11:04:05	CO HR, PPM	Span	1,632.8	1,744.4	3.7	Pass
	11:04:05	CO2, %	Span	11.6	11.6	0.0	Pass
	11:04:05	NOX HR, PPM	Span	1,734.1	1,743.7	0.3	Pass

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Attachment 4. CEMDAS Alarms Report sample printout

CLIENT

LOCATION

Alarms Report

04/04/2016 - 04/07/2016

Created on : Apr 07. 2016 14:52:18

UNIT

Date	Timestamp	Parameter	Alarm Value	Alarm Type	Alarm Description	Limit	Reason Code	Comment
04/04/2016								
	15:13:47				CEMDAS IN		9	
	15:13:48	NOX LR, PPM	0		UMBILICAL FAULT		9	
	15:13:48	NOX HR, PPM	0		UMBILICAL FAULT		9	
	15:13:48	CO LR, PPM	0		UMBILICAL FAULT		9	
	15:13:48	CO HR, PPM	0		UMBILICAL FAULT		9	
	15:13:48	CO2, %	0		UMBILICAL FAULT		9	
	15:13:48	NOX, PPM	0		UMBILICAL FAULT		9	
	15:13:48	CO, PPM	0		UMBILICAL FAULT		9	
	15:13:48	NOX, LB/mmBTU	0		UMBILICAL FAULT		9	
	15:13:48	CO, LB/mmBTU	0		UMBILICAL FAULT		9	
	15:13:48	NOX, LB/HR	0		UMBILICAL FAULT		9	
	15:13:48	CO, LB/HR	0		UMBILICAL FAULT		9	
	15:13:48				I/O SYS IN		9	
04/05/2016								
	07:21:43				CEMDAS IN		9	
	07:21:44				I/O SYS IN		9	
	09:43:02	NOX LR, PPM	0		MONITOR FAULT		9	
	09:43:02	NOX HR, PPM	0		MONITOR FAULT		9	
	09:43:02	NOX, PPM	0		MONITOR FAULT		9	
	09:43:02	NOX, LB/mmBTU	0		MONITOR FAULT		9	
	09:43:02	NOX, LB/HR	0		MONITOR FAULT		9	
	09:43:22	CO LR, PPM	0		MONITOR FAULT		9	
	09:43:22	CO HR, PPM	0		MONITOR FAULT		9	

Reason Code Definitions

9 = Unknown

CEMDAS Evolution™

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Attachment 5. CEMDAS Availability Report sample printout

CLIENT | **Availability Report** | Created on : Apr 07, 2016 14:53:45

LOCATION | 04/04/2016 - 04/07/2016 | UNIT

Start Time	End Time	NOX LR, PPM Status	Reason Code	Comments
04/04/2016 00:00:00	04/04/2016 15:12:59	COS		
04/04/2016 15:13:00	04/04/2016 15:15:59	UTF	9	
04/04/2016 15:16:00	04/05/2016 07:20:59	COS		
04/05/2016 09:44:00	04/05/2016 09:45:59	FLT		
04/05/2016 13:24:00	04/05/2016 13:25:59	IAF		
04/05/2016 13:31:00	04/05/2016 13:45:59	FLT		
04/05/2016 13:46:00	04/05/2016 13:48:59	IAF		
04/05/2016 13:52:00	04/05/2016 13:55:59	MOS	9	
04/05/2016 15:11:00	04/05/2016 15:12:59	FLT		
04/06/2016 06:21:00	04/06/2016 07:42:59	MOC		
04/06/2016 07:43:00	04/06/2016 07:44:59	FLT	9	
04/06/2016 07:45:00	04/06/2016 07:45:59	COS		
04/06/2016 07:46:00	04/06/2016 08:06:59	IOS		
04/06/2016 08:07:00	04/06/2016 08:19:59	FLT		
04/06/2016 08:20:00	04/06/2016 11:59:59	MOC		
04/06/2016 12:04:00	04/06/2016 12:28:59	MOC		
04/06/2016 12:29:00	04/06/2016 14:04:59	COS		
04/06/2016 14:05:00	04/06/2016 15:59:59	MOC		
04/06/2016 16:04:00	04/06/2016 19:59:59	MOC		
04/06/2016 20:04:00	04/06/2016 23:59:59	MOC		
04/07/2016 00:04:00	04/07/2016 03:59:59	MOC		

Reason Code Definitions

9 = Unknown

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CLIENT | **Availability Report** | Created on : Apr 07, 2016 14:53:45

LOCATION | 04/04/2016 - 04/07/2016 | UNIT

Start Time	End Time	NOX LR, PPM Status	Reason Code	Comments
04/07/2016 04:04:00	04/07/2016 06:04:59	MOC		
04/07/2016 06:21:00	04/07/2016 07:59:59	MOC		
04/07/2016 08:05:00	04/07/2016 08:17:59	MOC		
04/07/2016 08:18:00	04/07/2016 08:18:59	MOS		
04/07/2016 08:21:00	04/07/2016 08:26:59	MOC		
04/07/2016 08:27:00	04/07/2016 08:28:59	MOS	9	
04/07/2016 08:31:00	04/07/2016 08:32:59	MOC		
04/07/2016 08:33:00	04/07/2016 08:33:59	MOS		
04/07/2016 08:36:00	04/07/2016 08:36:59	MOC		
04/07/2016 08:37:00	04/07/2016 08:38:59	MOS	9	
04/07/2016 08:39:00	04/07/2016 08:40:59	UTF		
04/07/2016 08:41:00	04/07/2016 08:48:59	MOS	9	
04/07/2016 08:50:00	04/07/2016 08:52:59	MOS	9	
04/07/2016 08:55:00	04/07/2016 09:10:59	MOC		
04/07/2016 09:11:00	04/07/2016 09:11:59	MOS		
04/07/2016 09:14:00	04/07/2016 09:16:59	MOC		
04/07/2016 09:17:00	04/07/2016 09:19:59	MOS	9	
04/07/2016 09:22:00	04/07/2016 09:23:59	MOC		
04/07/2016 09:24:00	04/07/2016 09:27:59	MOS	9	
04/07/2016 09:30:00	04/07/2016 09:33:59	MOC		
04/07/2016 09:34:00	04/07/2016 09:38:59	MOS	9	

Reason Code Definitions

9 = Unknown

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CLIENT

LOCATION

Availability Report

04/04/2016 - 04/07/2016

Created on : Apr 07, 2016 14:53:45

UNIT

Start Time	End Time	NOX LR, PPM Status	Reason Code	Comments
04/07/2016 09:40:00	04/07/2016 09:47:59	MOC		
04/07/2016 09:48:00	04/07/2016 09:55:59	MOS	9	
04/07/2016 09:57:00	04/07/2016 09:58:59	MOS	9	
04/07/2016 10:01:00	04/07/2016 10:04:59	MOC		
04/07/2016 10:05:00	04/07/2016 10:06:59	MOS	9	
04/07/2016 10:08:00	04/07/2016 10:39:59	MOC		
04/07/2016 12:49:00	04/07/2016 13:05:59	MOC		

Reason Code Definitions

9 = Unknown

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CLIENT

LOCATION

Availability Report

04/04/2016 - 04/07/2016

Created on : Apr 07, 2016 14:53:45

UNIT

Availability Summary for NOX LR, PPM

```
CEMDAS OUT OF SERVICE <COS>     for      32 hours 55 minutes (37.89%)
UMBILICAL FAULT <UTF>           for       0 hours  5 minutes (0.10%)
MONITOR FAULT <FLT>             for       0 hours 34 minutes (0.65%)
CONVERTER FAULT <IAF>           for       0 hours  5 minutes (0.10%)
MONITOR OUT OF SERVICE <MOS>    for       0 hours 46 minutes (0.88%)
MONITOR OUT OF CONTROL <MOC>    for      24 hours 38 minutes (28.35%)
I/O SYS OUT <IOS>               for       0 hours 21 minutes (0.40%)
PROBE TEMP FAULT <PTF>          for       0 hours  0 minutes (0.00%)
MOISTURE FAULT <MST>            for       0 hours  0 minutes (0.00%)

MONITOR AVAILABLE                  27 hours 29 minutes  (31.63%)
```

Reason Code Definitions

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Attachment 6. CEMDAS Monthly Average & Total Report sample printout

CLIENT | **Average and Totals Report** | Created on : Apr 07, 2016 14:59:10

LOCATION | 04/01/2016 - 04/07/2016 | UNIT

Date	PROCESS Daily Block	PROCESS, Hrs Daily Total
04/01/2016	0.0	0.0
04/02/2016	0.0	0.0
04/03/2016	0.0 UNO	0.0
04/04/2016	0.0 UNO	0.0
04/05/2016	0.0 SVC	0.3
04/06/2016	0.0 UNO	0.0
04/07/2016	0.0	0.0
	0.0	0.3

Status Code Definitions

SVC = MONITOR IN SERVICE   UNO = UNIT NOT OPERATING

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CLIENT | **Average and Totals Report** | Created on : Apr 07, 2016 14:59:10

LOCATION | 04/01/2016 - 04/07/2016 | UNIT

Date	DIESEL FLOW, GAL/HR Daily Block	DIESEL FLOW, GALs Daily Total
04/01/2016	0.000	0.000
04/02/2016	0.000	0.000
04/03/2016	0.000 COS	0.000
04/04/2016	0.000 NSA	0.000
04/05/2016	0.000 NSA	0.000
04/06/2016	0.012 NSA	0.000
04/07/2016	0.000	0.000
	0.000	0.000

Status Code Definitions

COS = CEMDAS OUT OF SERVICE   NSA = NO SAMPLE AVAILABLE

CEMDAS Evolution™ | Page 2 of 7

CLIENT | **Average and Totals Report** | Created on : Apr 07, 2016 14:59:10

LOCATION | 04/01/2016 - 04/07/2016 | UNIT

Date	DIESEL HEAT, mmBTU/HR Daily Block	DIESEL HEAT, mmBTUs Daily Total
04/01/2016	0.0	0.0
04/02/2016	0.0	0.0
04/03/2016	0.0 COS	0.0
04/04/2016	0.0 NSA	0.0
04/05/2016	0.0 NSA	0.0
04/06/2016	0.0 NSA	0.0
04/07/2016	0.0	0.0
	0.0	0.0

Status Code Definitions

COS = CEMDAS OUT OF SERVICE   NSA = NO SAMPLE AVAILABLE

CEMDAS Evolution™ | Page 3 of 7

CLIENT | **Average and Totals Report** | Created on : Apr 07, 2016 14:59:10

LOCATION | 04/01/2016 - 04/07/2016 | UNIT

Date	NOX, LB/mmBTU Daily Block	NOX, LB/mmBTU 30-Day Rolling
04/01/2016	0.000	0.000
04/02/2016	0.000	0.000
04/03/2016	0.000 COS	0.000
04/04/2016	0.000 COS	0.000
04/05/2016	0.000 FLT	0.000
04/06/2016	0.000 NSA	0.000
04/07/2016	0.000	0.000
	0.000	

Status Code Definitions

COS = CEMDAS OUT OF SERVICE   FLT = MONITOR FAULT NSA = NO SAMPLE AVAILABLE

CEMDAS Evolution™ | Page 4 of 7

CLIENT

Average and Totals Report

Created on : Apr 07, 2016 14:59:10

LOCATION

04/01/2016 - 04/07/2016

UNIT

Date	CO, LB/mmBTU Daily Block		CO, LB/mmBTU 30-Day Rolling
04/01/2016	0.000		0.000
04/02/2016	0.000		0.000
04/03/2016	0.000	COS	0.000
04/04/2016	0.000	COS	0.000
04/05/2016	0.196	FLT	0.000
04/06/2016	0.000	NSA	0.000
04/07/2016	0.000		0.000
	0.000		

Status Code Definitions

COS = CEMDAS OUT OF SERVICE FLT = MONITOR FAULT NSA = NO SAMPLE AVAILABLE

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CLIENT

Average and Totals Report

Created on : Apr 07, 2016 14:59:10

LOCATION

04/01/2016 - 04/07/2016

UNIT

Date	NOX, LB/HR Daily Block		NOX, LB/HR 30-Day Rolling	NOX, LBs Daily Total
04/01/2016	0.00		0.00	0.00
04/02/2016	0.00		0.00	0.00
04/03/2016	0.00	COS	0.00	0.00
04/04/2016	0.00	COS	0.00	0.00
04/05/2016	0.00	FLT	0.00	0.00
04/06/2016	0.00	NSA	0.00	0.00
04/07/2016	0.00		0.00	0.00
	0.00			0.00

Status Code Definitions

COS = CEMDAS OUT OF SERVICE FLT = MONITOR FAULT NSA = NO SAMPLE AVAILABLE

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CLIENT

Average and Totals Report

Created on : Apr 07, 2016 14:59:10

LOCATION

04/01/2016 - 04/07/2016

UNIT

Date	CO, LB/HR Daily Block		CO, LB/HR 30-Day Rolling	CO, LBs Daily Total
04/01/2016	0.00		0.00	0.00
04/02/2016	0.00		0.00	0.00
04/03/2016	0.00	COS	0.00	0.00
04/04/2016	0.00	COS	0.00	0.00
04/05/2016	0.00	FLT	0.00	0.00
04/06/2016	0.00	NSA	0.00	0.00
04/07/2016	0.00		0.00	0.00
	0.00			0.00

Status Code Definitions

COS = CEMDAS OUT OF SERVICE FLT = MONITOR FAULT NSA = NO SAMPLE AVAILABLE

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Attachment 7. CEMDAS Excess Emissions Report sample printout

CLIENT

Excess Emissions Report

Created on : Apr 07, 2016 15:14:52

LOCATION 04/01/2016 - 04/07/2016 UNIT

Timestamp	NOX, LB/mmBTU 30 Day Rolling Limit Based Hi Hi	Limit	Reason Code	Comments

There were no periods in excess of standard.

Total exceedance incidents during the period: 0

Reason Code Definitions

CEMDAS Evolution™ Page 1 of 2

Attachment 8. CEMDAS Uptime Report sample printout

CLIENT **Uptime Report** Created on : Apr 07, 2016 15:12:23

LOCATION 04/01/2016 - 04/07/2016 UNIT

Start Time	End Time	Fc FACTOR, SCF/mmBTU Status	Reason Code	Comments

There were no invalid periods of 'Fc FACTOR, SCF/mmBTU' downtime during unit operation.

Reason Code Definitions

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CLIENT **Uptime Report** Created on : Apr 07, 2016 15:12:23

LOCATION 04/01/2016 - 04/07/2016 UNIT

Uptime Summary for Fc FACTOR, SCF/mmBTU

```
MONITOR OUT OF SERVICE <MOS>                  for     0 hours (  0.00%)
UNKNOWN STATUS (PRESUMED INVALID) <UNK>       for     0 hours (  0.00%)
CEMDAS OUT OF SERVICE <COS>                   for     0 hours (  0.00%)
I/O SYS OUT <IOS>                             for     0 hours (  0.00%)
PURGE CALIB <PRG>                             for     0 hours (  0.00%)
LOW QTRLY CALIBRATION <LOW>                   for     0 hours (  0.00%)
MID QRTLY CALIBRATION <MID>                   for     0 hours (  0.00%)
HI QRTLY CALIBRATION <HIL>                    for     0 hours (  0.00%)
PROBE FAULT <PRB>                             for     0 hours (  0.00%)
HEATER FAULT <HTR>                            for     0 hours (  0.00%)
MOISTURE FAULT <MST>                          for     0 hours (  0.00%)
MONITOR FAULT <FLT>                           for     0 hours (  0.00%)
CALIBRATION <CAL>                             for     0 hours (  0.00%)
SPAN CALIBRATION <SPN>                        for     0 hours (  0.00%)
ZERO CALIBRATION <ZER>                        for     0 hours (  0.00%)
INTERFERENCE FAULT <INT>                      for     0 hours (  0.00%)
NO SAMPLE AVAILABLE <NSA>                     for     0 hours (  0.00%)
MONITOR OUT OF CONTROL <MOC>                  for     0 hours (  0.00%)
MONITOR OUT OF RANGE <MOR>                    for     0 hours (  0.00%)
HOLD LAST VALUE <HLD>                         for     0 hours (  0.00%)
EXCLUDED ALARM <XCL>                          for     0 hours (  0.00%)
MONITOR IN SERVICE <SVC>                      for     9 hours (100.00%)
CONVERTER FAULT <IAF>                         for     0 hours (  0.00%)
                TOTAL ELAPSED TIME WAS      : 159 hours
                UNIT OPERATING FOR          : 9 hours
                UNIT NOT OPERATING FOR      : 150 hours

                MONITOR UPTIME PERCENTAGE         : 100.00%
```

Reason Code Definitions

CEMDAS Evolution™ Page 2 of 32

Attachment 9. CEMDAS Quarterly CGA Report sample printout

CLIENT

CGA Report

Created on : Apr 07, 2016 12:48:40

LOCATION

04/07/2016 - 04/07/2016

UNIT

Date	Parameter	Run#	Timestamp	Type	Expected	Measured	Low Difference	Mid Difference
04/07/2016								
	CO HR, PPM	1	12:28:13	QTR_LOW	749.6	1,731.8	982.2	
	CO HR, PPM	1	12:30:15	QTR_MID	1,658.0	1,731.8		73.8
	CO HR, PPM	2	12:36:22	QTR_LOW	749.6	1,731.8	982.2	
	CO HR, PPM	2	12:38:24	QTR_MID	1,658.0	1,731.8		73.8
	CO HR, PPM	3	12:44:29	QTR_LOW	749.6	1,731.8	982.2	
	CO HR, PPM	3	12:46:31	QTR_MID	1,658.0	1,731.8		73.8

Arithmetic Mean of Quarterly Low: 1731.8
Calibration Error of Quarterly Low: 131.0

Arithmetic Mean of Quarterly Mid: 1731.8
Calibration Error of Quarterly Mid: 4.5

Calibration Tolerance: 15.0
Calibration Result : Fail

CEMS Type : Full Extractive
Manufacturer: CAI
Model Number : 602
Serial Number: C01012-M
Monitor Certification Date:

Tested By : ___________________________

Date: ________________________________

CEMDAS Evolution™

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CLIENT

CGA Report

Created on : Apr 07, 2016 13:31:20

LOCATION

04/07/2016 - 04/07/2016

UNIT

Date	Parameter	Run#	Timestamp	Type	Expected	Measured	Low Difference	Mid Difference
04/07/2016								
	CO HR, PPM	1	13:12:01	QTR_LOW	484.0	476.4	7.6	
	CO HR, PPM	1	13:14:04	QTR_MID	1,744.4	1,736.8		7.6
	CO HR, PPM	2	13:20:10	QTR_LOW	484.0	475.2	8.8	
	CO HR, PPM	2	13:22:13	QTR_MID	1,744.4	1,735.6		8.8
	CO HR, PPM	3	13:28:17	QTR_LOW	484.0	473.9	10.1	
	CO HR, PPM	3	13:30:20	QTR_MID	1,744.4	1,734.3		10.1

Arithmetic Mean of Quarterly Low: 475.2
Calibration Error of Quarterly Low: 1.8

Arithmetic Mean of Quarterly Mid: 1735.6
Calibration Error of Quarterly Mid: 0.5

Calibration Tolerance: 15.0
Calibration Result : Pass

CEMS Type : Full Extractive
Manufacturer: CAI
Model Number : 602
Serial Number: C01012-M
Monitor Certification Date:

Tested By : ___________________________

Date: ________________________________

CEMDAS Evolution™

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Attachment 10. CEMDAS RATA Audit Results sample printout

CLIENT

RATA Data Report

Created on : Apr 07, 2016 15:13:28

LOCATION

4/7/2016 2:52:14 PM - 4/7/2016 3:12:14 PM

UNIT

Time	Fc FACTOR, SCF/mmBTU	DIESEL Hc, BTU/GAL	PROCESS	NOX LR, PPM	NOX HR, PPM	CO LR, PPM	CO HR, PPM
14:52:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
14:53:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
14:54:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
14:55:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
14:56:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
14:57:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
14:58:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
14:59:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:00:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:01:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:02:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:03:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:04:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:05:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:06:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:07:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:08:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:09:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:10:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:11:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
15:12:00	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3
Average :	1420.0	128488.0	1.0	289.8	1734.9	109.5	1734.3

* Invalid Status

RATA Run # 1
Verified By: ______________________________

CEMDAS Evolution™ Page 1 of 3

Attachment 11. CEMDAS System Constants Sample Report

CLIENT

LOCATION

System Constants

Created on : Apr 12, 2016 15:03:50

Parameter	Lower Limit CU	Upper Limit CU	Lower Limit EU	Upper Limit EU	EU Offset	Maximum Operation	Minimum Operation	Potential Maximum	Maximum Recorded
Fc FACTOR, SCF/mmBTU	0	0	0	15000	0	0	0	0	0
DIESEL Hc, BTU/GAL	0	0	0	200000	0	0	0	0	0
SPARE, 1	0	0	0	100	0	0	0	0	0
PROCESS	0	1	0	1	0	0	0	0	0
NOX LR, PPM	-23839	-55	0	500	0	0	0	0	0
NOX HR, PPM	-23831	-17	0	3000	0	0	0	0	0
CO LR, PPM	-23822	2	0	200	0	0	0	0	0
CO HR, PPM	-23824	29	0	3000	0	0	0	0	0
CO2, %	-23821	22	0	20	0	0	0	0	0
NOX, PPM	0	0	0	3000	0	0	0	0	0
CO, PPM	0	0	0	3000	0	0	0	0	0
DIESEL FLOW, GAL/HR	-29788	29834	0	296.042	0	0	0	0	0
DIESEL HEAT, mmBTU/HR	0	0	0	250	0	0	0	0	0
NOX, LB/mmBTU	0	0	0	1	0	0	0	0	0
CO, LB/mmBTU	0	0	0	10	0	0	0	0	0
NOX, LB/HR	0	0	0	200	0	0	0	0	0
CO, LB/HR	0	0	0	200	0	0	0	0	0
Fc FACTOR, SCF/mmBTU	0	0	0	15000	0	0	0	0	0
DIESEL Hc, BTU/GAL	0	0	0	200000	0	0	0	0	0
SPARE, 1	0	0	0	100	0	0	0	0	0
PROCESS	0	1	0	1	0	0	0	0	0
NOX LR, PPM	-23834	-67	0	500	0	0	0	0	0
NOX HR, PPM	-23836	-53	0	3000	0	0	0	0	0
CO LR, PPM	-23823	-46	0	200	0	0	0	0	0
CO HR, PPM	-23821	24	0	3000	0	0	0	0	0

CEMDAS Evolution™ Page 1 of 11

Continuous Emissions Monitoring System EU Boiler 4A

Quality Assurance And Quality Control Plan

Company: Packaging Corp. of America
Site: Filer City, MI
System: Boiler 4A Full Extractive CEMS
Revision Date: January 24, 2014

Table of Contents

Section 1 Introduction

This Quality Assurance/Quality Control (QA/QC) Plan has been prepared to support the operation of the Continuous Emissions Monitoring System (CEMS) at Packaging Corp. of America, Filer City, MI installed for measurement of effluent pollutant concentrations of NO_X and O_2 .

The EPA has established requirements for monitoring, record keeping, and reporting pollutant levels in flue gases emitted from affected units. The CEMS discussed in this manual are governed by the regulations established under *Title 40 Code of Federal Regulations Part 60* (40 CFR Part 60), Appendix B, Performance Specifications and Appendix F, Quality Assurance Procedures, which include general requirements for the installation, certification, operation, and maintenance of the CEMS.

A.) Definitions of Quality Assurance and Quality Control

The QA procedures consist of two distinct and equally important functions.

Quality Assurance is the series of activities performed to evaluate the overall effectiveness of the maintenance and QC efforts. QC involves those activities undertaken to determine that the product or service is effective in maintaining an accurate and reliable output of CEMS data.

Quality Control functions are the control and improvement of the quality of the CEMS data by implementing QC policies and corrective actions. QC functions are often comprised of a series of frequent internal checks, such as system inspections, periodic calibrations, and routine maintenance. Quality Assurance involves less frequent external checks on product quality and is used to evaluate the total quality control process.

These two functions form a control loop: When the evaluation function indicates that the data quality is inadequate, the control effort must be increased until the data quality is acceptable. In order to provide uniformity in the assessment and reporting of data quality, this procedure explicitly specifies the assessment methods for response drift and accuracy.

External quality assurance evaluations may include independent system audits, third party sampling and analysis, and/or comparisons to known calibration standards.

B.) Quality Assurance Policy

Packaging Corp. of America's policy is to efficiently operate and maintain its facilities in accordance with good operating practices (GOP) and applicable environmental regulations.

C.) Objective of Quality Assurance Plan

The objective of this QA plan is to define the necessary activities that guarantee CEMS data quality is maintained at acceptable levels. The plan also provides the framework for implementing QA activities by addressing items such as documentation, training, corrective actions, and preventive maintenance measures.

D.) Scope of Quality Assurance Plan

The QA Plan goal is to obtain and evaluate emissions data of known and acceptable quality in support of the air pollution control equipment operation. The data obtained is used to demonstrate compliance with the following EPA, state and local emission and monitoring regulations:

40 CFR 60, Appendix B, Performance Specification 2 & 3
40 CFR 60, Appendix F; Quality Assurance Procedures
Packaging Corp. of America Operating Permit

E.) Document Control

This QA/QC Plan includes procedures that ensure changes and revisions to this plan are communicated to all appropriate individuals. The Plant Manager will be responsible for ensuring that all changes and revisions are incorporated in the basic document. Periodic review of this QA Plan will help to insure that the QA process is working to provide efficient notice of required actions. Whenever inaccuracies occur for two consecutive quarters, Packaging Corp. of America must revise the current procedures or modify or replace the CEMS to correct the deficiency causing the excessive inaccuracies. The procedures must be kept on record and available for inspection by the enforcement agency.

Section 2 Description of Facility and CEMS

A.) Facility

EU Boiler 4A is a Natural Gas and Biogas Fired Babcock and Wilcox Model No. FM120-97 boiler. The boilers maximum capacity is 227 MMBtu/hr and is equipped with low NOx burners.

B.) Organization and Responsible Individuals:

Certain individuals and groups at the facility will have designated responsibilities to ensure that QA/QC activities are performed as required by this QAP program. The following is a typical organizational structure of responsibilities.

Mill Manager
Engineering/Technical Services Manager
Technical Services Manager
Environmental Manager
Electrical Maintenance Superintendent

Environmental Manager:

- Oversees the CEMS QA/QC program.
- Reviews all plans and reports for accuracy.
- Prepares certification/recertification applications and notifications to required regulatory agencies.
- Stays abreast of EPA regulation updates that may affect the CEMS programs and interprets as required.
- Coordinates and schedules CEMS audits, diagnostic tests and certification/recertification tests as required.
- Reviews the quarterly CEMS reports from each plant prior to submittal.
- Submits quarterly reports and certification/recertification test results to the applicable regulatory agencies.
- Support and provides training in the administration and maintenance of the CEMS QAP and generic CEMS Standard Operating Procedures (SOP) documents.
- Reviews CEMS data for validity and makes any necessary corrections so the proper data will be entered in the quarterly reports.
- Ensures records are maintained for out-of-control conditions.
- Notifies the Plant Manager of any abnormal conditions that cannot be resolved within existing CEMS procedures in a reasonable amount of time.
- Maintains files of all plant CEMS data (hardcopy and electronic), reports, calibration gas certificates, etc. for three years as required by the EPA (or as applicable to local regulatory requirements).
- Notifies appropriate plant personnel of scheduled CEMS audits and certification/recertification tests.
- Arranges for support needed by contractor for periodic audits and certification/recertification tests.
- Provides plant resources to assist contractors during audits and certification/recertification testing.

Plant Manager:

- Designates and manages manpower and other resources needed to properly maintain and operate the CEMS.
- Reviews and approves all plant-specific CEMS plans, procedures, and reports.
- Ultimately responsible for ensuring that all routine preventive maintenance is completed on schedule.

Technician or Operator:

- Perform the daily checks on CEMS systems.
- Perform regular maintenance on equipment as recommended by each manufacturer.
- Address and report any abnormal conditions to the Plant Manager.
- Make appropriate entries into the maintenance log.
- Maintain the spare parts inventory.
- Maintain audit filter certifications, if applicable.

C.) CEMS Overview

The CEMS is an integrated system manufactured by Monitoring Solutions, Inc. whose headquarters are based in Indianapolis, IN. The following figure presents a simplified illustration of CEMS gas flow (reference system drawings for specific component detail).

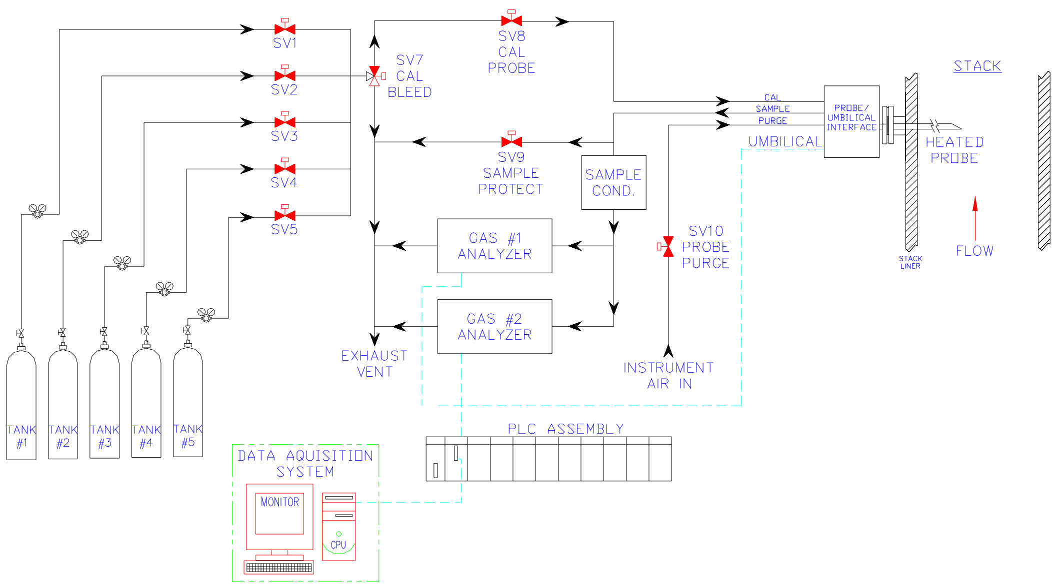

Figure 2-1. General CEMS Overview

CEMS (Continuous Emission Monitoring System) - performs the extractive sampling and measuring of the flue gas. The *Sample probe* is inserted into the gas stream and extracts a continuous sample of concentrated flue gas. The sample pump creates a pressure differential (vacuum) used to extract gas from the stack. The extracted sample is transported via the *umbilical system* through a *gas sample conditioner* and *gas control panel* to specific *gas analyzers*.

CEMCON (Continuous Emission Monitoring CONtroller System) - receives and stores data generated by the CEMS and automatically controls CEMS operations such as system purge, sample air flow, calibration, and detection of alarm conditions. In addition, it provides the communication link between CEMS and CEMDAS. The CEMCON system consists of a PLC controller with power supply and a multifunction keypad for operator interface.

CEMDAS (Continuous Emission Monitoring Data Acquisition System) - retrieves the data stored by the CEMCON and performs the required calculations to determine if the readings are within required limits. The system is designed to provide alarm messages and signals in the event the results do not meet applicable requirements. CEMDAS can also generate the required reports used in EPA audits and in evaluating system operability.

A complete set of operation and maintenance manuals for all components of the system is maintained by the Electrical Maintenance Superintendent. These manuals provide complete descriptions of the system and components including theory, installation, operation, and maintenance.

D.) Brand-Gaus Model 4705 O_2 Analyzer

Figure 2-2. Brand-Gaus Model 4705 O2 Analyzer

1) Specifications

Measurement technology	Zirconium oxide cell
Measurement range	0 to 25 % O2
Full scale range	25.0 % O2
Zero noise	< 0.02 %O2
Zero calibration drift	Better than ± 0.1 %O2
Span noise	< 0.02 %O2
Span calibration drift	Better than ± 0.1 %O2
Linearity error	< 1% of high calibration gas value
Interference (sum of all interferences	< 1% of measured value for typical applications
Response time	T95 < 10 seconds
Sample Flow rate	0.2 to 10 SLPM

2) Theory of Operation

The oxygen measurement makes use of the fact that zirconium conducts oxygen ions when heated above 600ºC. Platinum electrodes on the interior and exterior of a zirconium oxide tube provides a catalytic surface for the exchange of oxygen molecules and are transported through the body of the zirconium oxide. This charge transport ultimately sets up an electric potential across the electrodes that is proportional to the log of the ratio of oxygen concentrations on each side of the oxide. Thus, if a reference gas (usually instrument air at 20.9 %O2) flows across the inner electrode, the concentration of sample gas flowing across the outer electrode can be determined. In a conventional zirconium-oxide oxygen analyzer, this voltage is exponentiated to determine the concentration. This is done within the on-board microprocessor.

In the Brand-Gaus Model 4705, a second zirconium-oxide cell is ganged together to pump oxygen into the first cell, which is maintained at a constant voltage. The amount of oxygen needed to maintain the primary cell at the operating point is a more sensitive measurement of sample concentration, and allows for measurement at zero oxygen. This pump signal is carefully measured and related back to the sample concentration

3) Front Panel Controls

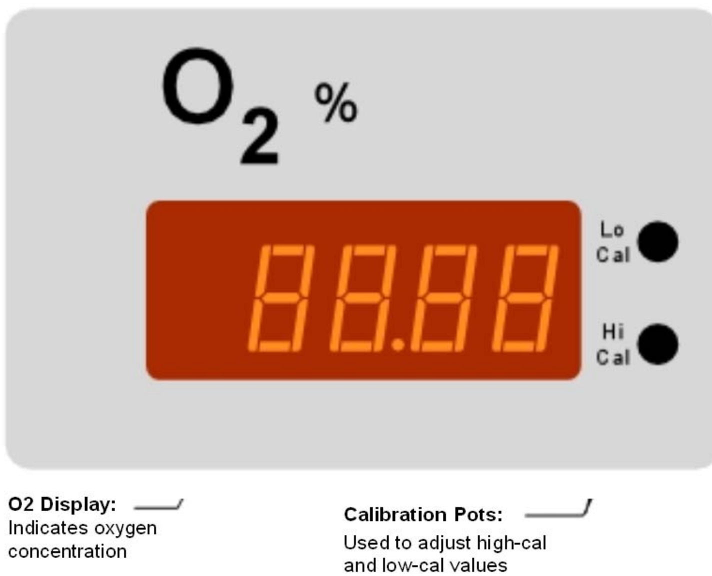

Figure 2-3. Model 4705 Front Panel Controls

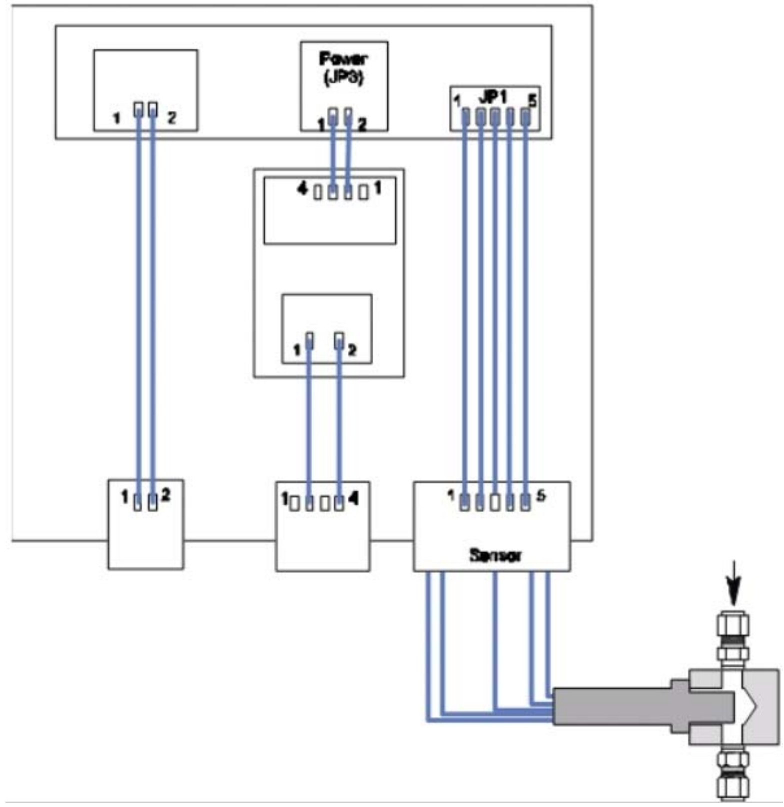

Figure 2-4. Model 4705 Wiring Diagram

4) Analyzer Setup

To ensure the quickest and most reliable startup, please follow the steps below in the order shown.

a.) Apply power and sample to analyzer

(1) Connect sensor (if external), analog signals, and AC wiring to the analyzer as depicted in the accompanying wiring diagram.

(2) Supply a metered amount of sample to the analyzer and verify the Sample flow. Meter should read be between 0.2 and 10 SLPM.

(3) Apply power to the instrument (85 to 250 VAC, 50-60 Hz).

Warning: This instrument is designed for use with 85 to 250 AC input power only. Serious equipment damage and/or injury will occur if it is connected to improper power.

(4) After a few seconds, the oxygen concentration display will illuminate. The display will move from zero up to the approximate sample value in about one minute. It will fully warm-up in approximately 30 to 60 minutes.

b.) Calibrate the analyzer.

5) Calibration

After installation and at least a 1-hour warm up period, the instrument can be calibrated via the following procedure.

> **Note:** The Brand-Gaus oxygen analyzer calibrations are generally very stable. If the calibration appears to have drifted significantly, or requires frequent adjustment, do not recalibrate the unit. Check for analyzer malfunction and/or check the sample delivery system for leaks or other problems.

c.) High calibration:

(1) Flow high calibration gas through the sample handling system and analyzer.
(2) Wait approximately two minutes or until reading settles.
(3) Adjust the reading with the HIGH CAL adjustment until the display indicates the concentration of the calibration gas. The calibration value is then stored.

d.) Low calibration:

(1) Flow low calibration gas through the sample handling system and analyzer. See note above, do not attempt to calibrate the analyzer below 1%.
(2) Wait approximately two minutes or until reading settles.
(3) Adjust the reading with the LOW CAL adjustment pot until the display indicates the concentration of the calibration gas. The calibration value is then stored.

e.) Check the high calibration point and recalibrate if required. It may be necessary to repeat the first two steps iteratively if the calibration has been changed dramatically for some reason.

E.) Thermo Fisher Scientific Corp. Model 42i-LS NO_X Analyzer

Figure 2-5. Model 42i Low Source NO-NO_2-NO_X Analyzer

1.) Principle of Operation

The analyzer is an analytical instrument capable of measuring oxides of nitrogen at levels from 0 to 500 parts per million. The Model 42i-LS offers fast response time, increased sensitivity, linearity through all ranges, and simplicity of operation. It features a sample pump, independent NO_X ranges, and a replaceable converter cartridge.

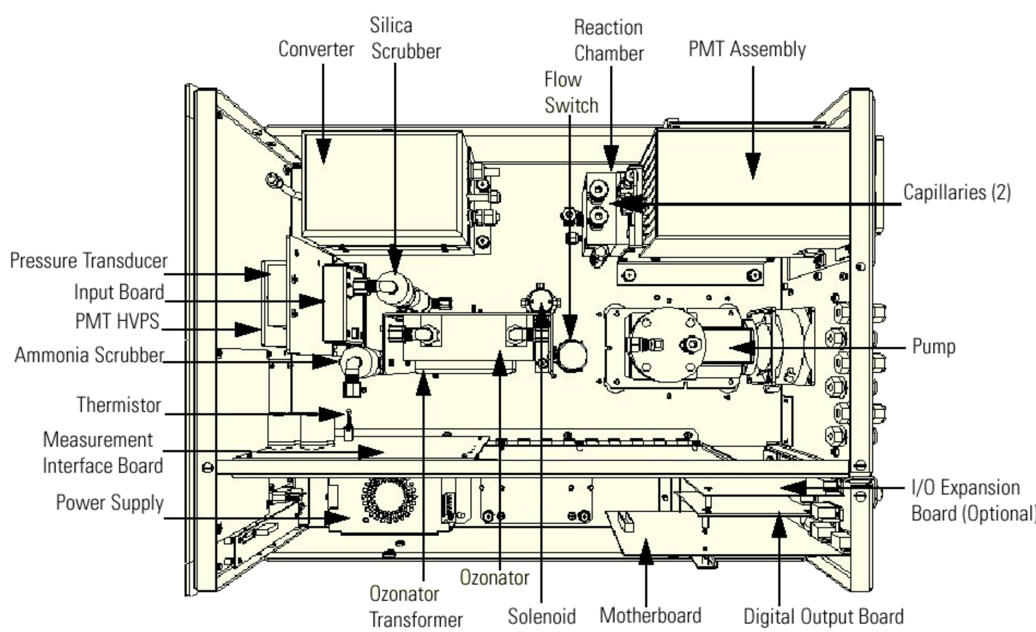

Figure 2-6. Component Layout

The Model 42i-LS operates on the principle that nitric oxide (NO) and ozone (O_3) react to produce a characteristic luminescence with an intensity linearly proportional to the NO concentration. Infrared light emission results when electronically excited NO_2 molecules decay to lower energy states. Specifically,

$$NO + O_3 \rightarrow NO_2 + O_2 + hv$$

Nitrogen dioxide (NO_2) must first be transformed into NO before it can be measured using the chemiluminescent reaction. NO_2 is converted to NO by a stainless steel NO_2-to-NO converter heated to about 625°C (the optional molybdenum converter is heated to 325°C).

The ambient air sample is drawn into the Model 42i-LS through the sample bulkhead. The sample flows through a capillary, and then to the mode solenoid valve. The solenoid valve routes the sample either straight to the reaction chamber (NO mode) or through the NO_2-to-NO converter and then to the reaction chamber (NO_X mode). A flow sensor prior to the reaction chamber measures the sample flow.

A permeation dryer provides a continuous stream of dry air to the ozonator (using the selective water permeation characteristics of the dryer.) The ozonator generates the ozone needed for the chemiluminescent reaction. At the reaction chamber, the ozone reacts with the NO in the sample to produce excited NO_2 molecules. A photomultiplier tube (PMT) housed in a thermoelectric cooler detects the luminescence generated during this reaction. From the reaction chamber, the exhaust travels through the ozone (O_3)converter to the pump, and is released through the vent.

The NO and NO_X concentrations calculated in the NO and NO_X modes are stored in memory. The difference between the concentrations is used to calculate the NO_2 concentration. The Model 42i-LS outputs NO, NO_2 ,and NO_X concentrations to the front panel display, the analog outputs, and also makes the data available over the serial or Ethernet connection.

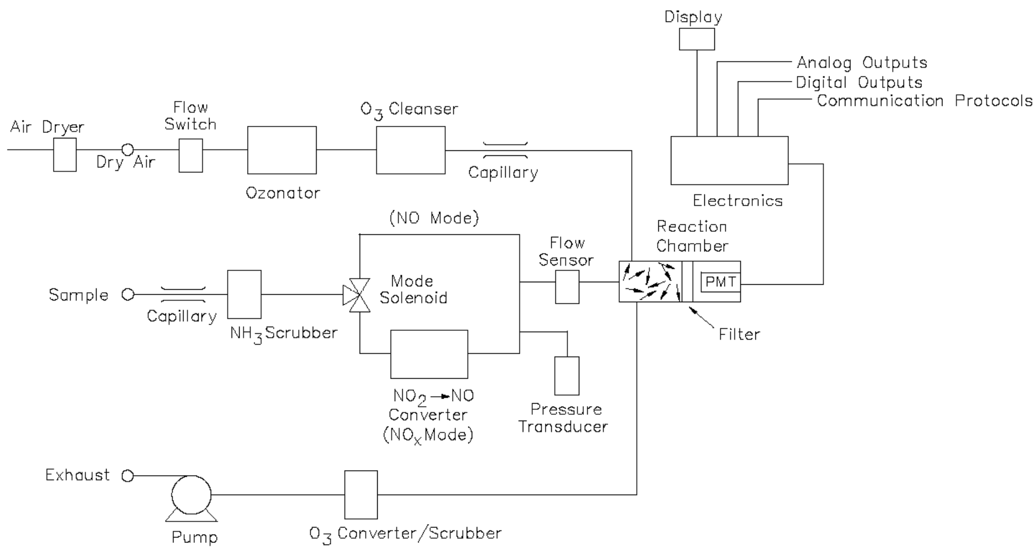

Figure 2-7. Internal Flow Schematic

2.) Maintenance Schedule

The typical preventative maintenance required for the analyzer involves changing the teflon filter at the sample inlet, typically on a quarterly basis, but more frequently if necessary. This part should be considered when determining spare parts requirements.

Operation of the Thermo Fisher Scientific Corp. Model 42i-LS NO_X analyzer is described in greater detail in the ***Thermo Fisher Scientific Corporation Model 42i Low Source Instruction Manual, NO-NO_2-NO_X Analyzer*** which is included with this manual.

F.) CEMDAS 2000™ Data Acquisition System

CEMDAS 2000™ is an automated PC-based data acquisition system custom designed for each client. Its primary functions are the acquisition, processing, storage, and reporting of CEMS data and related information. CEMDAS 2000™ facilitates all of the data reporting requirements necessary to establish compliance with EPA, state, and local operation permit limits. Coupled with a Monitoring Solutions PLC controller, the CEMDAS 2000™ package is a powerful, user-friendly Windows-based system for monitoring, recording, and reporting stack emission information. CEMDAS 2000™ receives analog and status signals from the CEMS components such as monitors and the PLC. CEMDAS 2000™ uses these inputs to prepare reports, summarize the data and information derived from the input signals.

CEMDAS performs two primary reporting functions: providing a picture in real time of the emissions process and generating reports of current and historic data. Current status may be viewed and reports requested at the system console and accessed by phone via modem (external phone line required for modem access). Reports can be generated automatically or manually, and sent to a printer, the screen, or a disk file. Available reports include minute, hourly, daily, monthly and quarterly reports, along with RATA and CGA/Linearity reports.

Section 3 Quality Assurance Activities

A.) Overview

The purpose of these procedures is to ensure that the CEMS installed at the Packaging Corp. of America - Filer City, MI facility operates in such a manner as to provide accurate and reliable data.

Table 3-1. Quality Assurance Checklist

Activity: Quality Assurance	Quarterly	Annual
Calibration Gas Audit	X*	
RATA		X

*3 out of 4 quarters

B.) CEMS Analyzer Summary

Table 3-2. CEMS Analyzer Summary

Pollutant or Diluent	**Full Scale Range**	**Full Scale Span**	**Analyzer Mfg**	**Model**
NO_X	0-1000ppm	500ppm	TECO	42C
O_2 Analyzer	0-25%	25%	Brand Gaus	4705

C.) Daily Calibration Drift Check

1.) Calibration Gases

Calibration gases shall be NIST/EPA approved Standard Reference Materials, Certified Reference materials per 40 CFR 60, Appendix F, Section 5.1.2 (3). A separate calibration gas cylinder must be used for each concentration.

2.) Calibration Error Test for Pollutant and Diluent Monitors – Part 60

Perform a two-point calibration error test on each pollutant and diluent gas monitor at least once per unit operating day (24 hours). A separate calibration gas cylinder must be used for each audit point. The following concentrations must be used in accordance with 40 CFR Part 60, Appendix B, Performance Specification 2, Section 6.1.2:

Table 3-3. Daily Calibration gas allowable ranges

Audit Level	**40 CFR 60**
Low-level	0-20% of span
High-level	50-100% of span

If a monitor fails a calibration error test, corrective action must be performed and documented, and a successful daily calibration error test performed before data can be considered valid. The CEMS calibration must, as minimum, be adjusted whenever the daily zero (or low-level) CD or the daily high-level CD exceeds two times the limits of the applicable PS. The Monitoring Solutions CEMS Operations and Maintenance Manual provides detailed calibration procedures.

3.) Out-of-Control Period for Pollutant and Diluent Analyzers – Part 60

An out-of-control period occurs for a pollutant or diluent analyzers when the daily low-level or daily mid-level CD exceeds two times the limit for five consecutive days, or four times the limit for one day.

Table 3-4. Out of Control Limits for Pollutant and Diluent Analyzers

Analyzer	Daily Calibration Drift	Out-of Control	
		Five (5) consecutive daily calibrations	Any daily calibration
NO_X	≤ 2.5 % of Span	≥ 5.0 % of Span	≥ 10.0% of Span
O_2	≤ 0.5% O_2 (Absolute)	≥ 1% O_2 (Absolute)	≥ 2.5% O_2 (Absolute)

Monitor adjustments, calibration, or repairs must be performed whenever CD limits are exceeded. The CD check must be repeated after any adjustment or repair. Whenever the CD is exceeded, a warning is displayed on the computer screen and a message is logged to a printable alarm file.

The beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive daily CD check with a failed CD or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a failed CD. The end of the out-of-control period is the time corresponding to the completion of appropriate adjustment and subsequent successful CD check.

Any time the CEMS is declared "out of control" or "out of service", it cannot be used to show compliance with permit limits or data capture requirements and shall be considered downtime for reporting purposes. Therefore, corrective action must be performed as soon as possible after determining that the CEMS is not operating to within required specifications.

D.) Cylinder Gas Audit: CEMS – Part 60

A quarterly cylinder gas audit must be performed on each CEMS at least once every calendar quarter, during three quarters of every year. Each CGA shall not be performed during a quarter in which a RATA is being performed.

Calibration Gases – Part 60

Calibration gases shall comply with per 40 CFR 60, Appendix F, Section 5.1.2 (3). Use audit gases that have been certified by comparison to National Bureau of Standards (NBS) gaseous Standard Reference Materials (SRM's) or NBS/EPA approved gas manufacturer's Certified Reference Materials (CRM's) following EPA Traceability Protocol No. 1. As an alternative to Protocol No. 1 audit gases, CRM's may be used directly as audit gases. A separate calibration gas cylinder must be used for each audit point.

1.) Procedure

The known gases are individually injected at the probe to be sampled through the entire sampling train, as the path used in extracting effluent from the process. Gas is injected until a stable reading is obtained.

The procedure is conducted as follows:

a) Connect all quarterly gas cylinders to the system and turn them on.
b) Verify/Set the corresponding calibration gas cylinder values in the calibration configuration menu in the DAS.
c) Then initiate the sequence by selecting the CGA option on the CEMDAS screen or the OIT.
   i) Each gas is routed through the system until a stable response is achieved.
   ii) Values are recorded as the system is allowed to operate in a normal sampling and analysis manner without adjustment.
d) The sequence is repeated through three audit runs.

For each audit cylinder (or audit point), the percent accuracy is determined by using the following equation:

$$A = \frac{(Cm - Ca)}{Ca} x100$$

Where:
A = Accuracy of CEMS (%)
Cm = Average CEMS response during audit in units of applicable standard or concentration
Ca = Average audit (cylinder gas certified value) in units of applicable standard or concentration

Accuracy (A) value of $\pm$15% or less is considered acceptable for criteria pollutants gas. If excessive inaccuracies occur for two consecutive quarters, Packaging Corp. of America must revise the QC procedures or modify or replace the CEMS.

Measurements are calculated and recorded by the PLC. The audits serve as verification of the accuracy of the CEMS data. Various reports can be generated to support audits and are kept on file by Packaging Corp. of America. The manufacturer's certification statement (if applicable) for the calibration gases are also included.

E.) Relative Accuracy Test Audit

1.) Relative Accuracy Test Audit

At least once in every four calendar quarters (except during a quarter in which the unit either did not run or in which a CGA is performed), conduct a Relative Accuracy Test Audit (RATA), as described in 40 CFR 60, App. B, PS 2, to assess the accuracy of the CEMS relative to the appropriate EPA reference methods used in determining effluent concentrations. Measured inaccuracy exceeding 20% of the mean value of the reference method results or 10% of the applicable standard, whichever is greater, requires corrective action to be taken. When appropriate, additional audits are conducted to demonstrate the effectiveness of the repair or adjustment.

Section 4 Quality Control Activities

A complete set of Operation and Maintenance manuals for all components of the CEMS are kept in the Maintenance Department.

Quality Assurance/Quality Control Plan

Each source owner or operator must develop and implement a QC program. As a minimum, each QC program must include written procedures which should describe in detail, complete, step-by-step procedures and operations for each of the following activities:

1. Calibration of CEMS.
2. CD determination and adjustment of CEMS.
3. Preventive maintenance of CEMS (including spare parts inventory).
4. Data recording, calculations, and reporting.
5. Accuracy audit procedures including sampling and analysis methods.
6. Program of corrective action for malfunctioning CEMS.

A.) QC Activities

An activity list summarizing various routine activities is presented in the following table. The Plant Manager is ultimately responsible for scheduling routine maintenance and ensuring that all routine preventive maintenance is completed on schedule.

Table 4-1. Quality Control Checklist

Activity: Quality Control
DAS Alarms Status
Analyzer Alarms Status
Zero Value Cal Check Passed/Record
Span Value Cal Check Passed/Record
Calibration gas cylinder(s)
Clean/Replace Filters - Analyzers
Clean/Inspect Sample Conditioner
Replace/Clean Filters - Probe
Change Air System Filters/Scrubbers
Clean Interior of Enclosure/Rack
Printer Maintenance

B.) CEMS Maintenance

All maintenance of the CEMS can be classified into one of these three areas:

1. Routine preventive maintenance. .

2. Non-routine preventive maintenance.

3. Corrective Maintenance.

C.) Spare Parts Inventory

The Mill minimizes monitoring equipment downtime by maintaining spare parts for "routine" repairs or otherwise predictable malfunctions. The spare parts inventory was established based on manufacturers' recommendations and past operating history. The spare parts inventory is maintained in a common equipment area and is managed by the Maintenance Department. A spare parts list is available upon request from the Maintenance Department.

Section 5 Data Recording and Reporting

A.) General Requirements

An effective quality assurance program communicates the results of QA/QC activities to all affected parties. This QA plan makes provisions for the proper recording and communication of QA and QC information and provides the necessary mechanisms for triggering corrective actions based on the contents of QA/QC reports.

Documentation of QA/QC data and information is an integral part of this QA Plan. This section describes reports and other records that provide appropriate documentation of QA/QC activities. *PACKAGING CORP. OF AMERICA* utilizes two primary means of documentation:

1. Data Acquisition System - CEMDAS 2000™
2. Manually prepared QA/QC forms, logs and reports.

All data must be available for review for a minimum of five (5) years from the date of each record and be available to the Division upon request at any time. It can be presented as either a computerized database or printed emission logs.

All reporting is to be on an Eastern Standard Time basis.

The data acquisition system must be capable of reading all values over the full range of each measurement device and must create a permanent record of all required raw and calculated data for storage, review and reporting. In addition a continuous readout in units of each applicable emission standard or operating criteria is required.

B.) Monitoring/Recordkeeping

Monitoring and recordkeeping requirements are defined in Renewable Operating Permit, MI-ROP-B3692-2009, incorporated here by reference.

C.) Reporting Requirements

Reporting requirements are defined in Renewable Operating Permit, MI-ROP-B3692-2009, incorporated here by reference.

GREENHOUSE GAS MONITORING PLAN

PREPARED IN ACCORDANCE WITH 40 CFR PART 98

Filer City, MI Mill

Prepared by:

Prepared for:

PACKAGING CORPORATION OF AMERICA

FILER CITY, MI MILL

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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 may not 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 not 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
Common Pipe Approach: No
Aggregation Approach: Yes
Common Stack Approach: No
CO_2 CEM Operating: No
Biogenic Emissions: Yes
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
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	$HHV_{(annual)} = \frac{\sum_{i=1}^{n}((HHV)_i \times (Fuel)_i)}{\sum_{i=1}^{n}(Fuel)_i}$ 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	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
Common Pipe Approach: N/A
Aggregation Approach: N/A
Common Stack Approach: N/A
CEM Operating: 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

GP-001 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

GP-002 CALCULATION METHODOLOGY REPORTING REQUIREMENTS					
Total Quantity of ***Biogas*** Combusted per month in ***GP-002*** (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			***N/A***		***N/A***

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

EUCOPELAND 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 ***Natural Gas*** 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 ***<u>Biogas</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
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 ***Spent Liquor Solids*** 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 ***Natural Gas*** 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							
6							
7							
8							
9							
10							
11							
12							
13							
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							
29							
30							
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