MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating (RO) Permit program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as described in General Condition No. 22 in the RO Permit and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: Packaging Corporation of America — County: Manistee

Source Address: 2246 Udell Street — City: Filer City

AQD Source ID (SRN): B3692 — RO Permit No.: MI-ROP-B3692-2015a — RO Permit Section No.:

Please check the appropriate box(es):

☐ **Annual Compliance Certification (General Condition No. 28 and No. 29 of the RO Permit)**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the RO Permit.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the RO Permit, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the RO Permit, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (General Condition No. 23 of the RO Permit)**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the RO Permit were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From NA To NA

Additional monitoring reports or other applicable documents required by the RO Permit are attached as described:

Report for PM Stack Testing on EUCOPELAND+DISTANK 9-17-15

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete.

Robert J. Peretin	Mill Manager	(231) 723-9951
Name of Responsible Official (print or type)	Title	Phone Number
Robert J. Peretin	MILL MANAGER	9/29/15
Signature of Responsible Official		Date

* Photocopy this form as needed.

BTEC Inc.

EUCOPELAND+DISTANK Particulate Matter Emissions Test Report

Prepared for:

Packaging Corporation of America

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

Project No. 15-4749.00
September 25, 2015

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073
(248) 548-8070

Executive Summary

BT Environmental Consulting, Inc. (BTEC) was retained by Packaging Corporation of America (PCA) to conduct a compliance emissions test program on one source associated with the EUCOPELAND+DISTANK at the PCA facility in Filer City, Michigan. This emissions testing program included evaluation of particulate matter (PM) from the EUCOPELAND+DISTANK without the wet electrostatic precipitator (WESP) operating. Sampling was conducted on September 17th, 2015.

Testing consisted of triplicate 60-minute test runs for PM. Sampling was performed utilizing United States Environmental Protection Agency (USEPA) test methods. The results of the emissions test program are highlighted by Table E-I.

Table E-I
Overall Results Summary
Sampling Dates: September 17, 2015

Source	Pollutant*	Average Test Result	Emission Limit
EUCOPELAND+DISTANK	PM	0.03*	0.20*

*lb/1,000 lb (wet) corrected to 50% excess air

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1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Packaging Corporation of America (PCA) to conduct a compliance emissions test program on one source associated with the EUCOPELAND+DISTANK at the PCA facility in Filer City, Michigan. This emissions testing program included evaluation of particulate matter (PM) from the EUCOPELAND+DISTANK without the wet electrostatic precipitator (WESP) operating. Sampling was conducted on September 17th, 2015.

The Air Quality Division (AQD) of Michigan's Department of Environmental Quality has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (December 2013). The following is a summary of the emissions test program and results in the format suggested by the aforementioned document.

1.a Identification, Location, and Dates of Test

The source tested is located at the PCA facility located in Filer City, Michigan. Testing on the EUCOPELAND+DISTANK was conducted September 17, 2015.

1.b Purpose of Testing

The purpose of the testing is to demonstrate compliance with Michigan Renewable Operating Permit No. MI-ROP-B3692-2015.

Table 1
Renewable Operating Permit No. MI-ROP-B3692-2015 Limitations

Source	Pollutant	Emission Limit
EUCOPELAND+ DISTANK	PM	0.20*

*lb/1,000 lb (wet) corrected to 50% excess air

1.c Source Description

The EUCOPELAND+DISTANK at the PCA facility is a fluidized bed reactor (Copeland Reactor), which recovers sodium carbonate from the spent pulping liquor, or black liquor. Black liquor is fired into the Copeland Reactor at approximately 50% solids. Organic material in the liquor burns and the resultant sodium forms sodium carbonate pellets. Pellets are drawn off to maintain the proper fluidized bed height.

Exhaust gases are conveyed to two (2) parallel cyclones, then to a venturi scrubber, and a separator vessel equipped with a de-mister section before being exhausted to a wet

electrostatic precipitator (WESP) followed by a regenerative thermal oxidizer (RTO) to reduce Hazardous Air Pollutants (HAP) emissions from the Copeland Reactor.

1.d Test Program Contact

The contact for information regarding the test program as well as the test report is:

Ms. Sara Kaltunas
Packaging Corporation of America
2246 Udell Street
Filer City, MI 49634
(231) 723-9951 ext. 465

Mr. Barry P. Boulianne
Senior Project Manager
BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, MI 48073
(313) 449-2361

1.e Test Personnel

Names and affiliations for personnel who were present during the testing program are summarized by Table 1.

Table 2
Test Personnel

Name	Affiliation
Sara Kaltunas	PCA
Steve Smith	BTEC
Todd Wessel	BTEC
Robert Dickman	MDEQ-AQD

2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions test program.

2.a Operating Data

Process data monitored during the emissions test program included RTO temperature, black liquor solids firing rate (tons per hour), and differential pressure across the venturi scrubber.

2.b Applicable Permit

The emission units tested for the Copeland Reactor are included in Michigan Renewable Operating Permit No. MI-ROP-B3692-2015.

2.c Results

The results of the emissions test program are summarized by Table 3. Detailed results for the test runs are summarized in Table 4.

2.d Emission Regulation Comparison

The overall results of the emission test were below the limit of 0.20 lb/1,000 lb (wet) corrected to 50% excess air.

3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

3.a Process Description

Section 1.c provide a detailed description of the process.

3.b Process Flow Diagram

Due to the simplicity of the Copeland Reactor operations, a process flow diagram is not necessary.

3.c Raw and Finished Materials

Spent black liquor at 50% solids (Copeland Reactor).

3.d Process Capacity

During the testing the Copeland Reactor was operated at 50-65 GPM.

3.e Process Instrumentation

Exhaust gases from the Copeland Reactor pass through two cyclones, Venturi scrubber, mist eliminator, wet electrostatic precipitator and a regenerative thermal oxidizer. During operation, the Venturi scrubber differential pressure and RTO combustion chamber temperature are monitored.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used during the testing.

4.a Sampling Train and Field Procedures

Sampling and analytical methodologies for the emissions test program can be separated into two categories as follows:

(1) Measurement of exhaust gas velocity, molecular weight, and moisture content;
(2) Measurement of exhaust gas filterable PM concentration;

Sampling and analytical methodologies by category are summarized below.

Exhaust Gas Velocity, Molecular Weight, and Moisture Content

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Method 1 and Method 2. S-type pitot tubes with thermocouple assemblies, calibrated in accordance with Method 2, Section 4.1.1, were used to measure exhaust gas velocity pressures (using a manometer) and temperatures during testing. The S-type pitot tube dimensions outlined in Sections 2-6 through 2-8 were within specified limits, therefore, a baseline pitot tube coefficient of 0.84 (dimensionless) was assigned. A diagram of the sample points is provided in Figure 1.

Cyclonic flow checks were performed at each sampling location. The existence of cyclonic flow is determined by measuring the flow angle at each sample point. The flow angle is the angle between the direction of flow and the axis of the stack. If the average of the absolute values of the flow angles is greater than 20 degrees, cyclonic flow exists. The null angle was determined to be less than 20 degrees at each sampling point.

The Molecular Weight of the gas stream was evaluated according to procedures outlined in Title 40, Part 60, Appendix A, Method 3A. The O_2 /CO_2 content of the gas stream was measured using a Fyrite combustion analyzer.

Exhaust gas was extracted as part of the sampling train. Exhaust gas moisture content was then determined gravimetrically.

Filterable Particulate Matter – Method 5

40 CFR 60, Appendix A, Method 5, "Determination of Particulate Emissions from Stationary Sources" was used to measure PM concentrations and calculate appropriate emission rates (see Figure 2 for a schematic of the sampling train).

BTEC's Nutech® Model 2010 modular isokinetic stack sampling system consisted of (1) a stainless steel nozzle, (2) a glass probe, (3) a set of four Greenburg-Smith (GS) impingers with the first two with 100 ml of H2O (ii) an empty impinger, (iii) and an impinger filled with approximately 300 grams of silica gel, (4) a length of sample line, and (5) a Nutech® control case equipped with a pump, dry gas meter, and calibrated orifice.

Upon completion of the final leak test for each test run, the filter was recovered, and the nozzle, probe, and the front half of the filter holder assembly were brushed and triple rinsed with 100 ml of acetone which was collected in a pre-cleaned sample container.

BTEC labeled each container with the test number, test location, and test date, and marked the level of liquid on the outside of the container. In addition, blank samples of the acetone and filter were collected. BTEC personnel carried all samples to BTEC's laboratory (for filter and acetone gravimetric analysis) in Royal Oak, Michigan.

4.b Recovery and Analytical Procedures

Descriptions of the recovery procedures are provided in section 4.a for each sampling method.

4.c Sampling Ports

A diagram of the stack showing sampling ports are included as Figure 1.

4.d Traverse Points

A diagram of the stack showing sampling ports are included as Figure 1.

5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

5.a Results Tabulation

The overall results of the emissions test program are summarized by Table 3. Emission limits are summarized by Table 1. Detailed results for the emissions test program are summarized by Table 4.

5.b Discussion of Results

The average results of the particulate matter emissions of the EUCOPELAND+DISTANK are below the corresponding limits.

Table 3
Overall Results Summary
Sampling Dates: September 17, 2015

Source	Pollutant*	Average Test Result	Emission Limit
EUCOPELAND +DISTANK	PM	0.03*	0.20*

*lb/1,000 lb (wet) corrected to 50% excess air

5.c Sampling Procedure Variations

There were no sampling variations used during the emission compliance test program.

5.d Process or Control Device Upsets

No process or control device upsets occurred during the emissions test program.

5.e Control Device Maintenance

There was no control equipment maintenance performed during the emissions test program.

5.f Audit Sample Analyses

Audit samples were not analyzed as part of this emissions test program.

5.g Calibration Sheets

Calibration documents are provided as Appendix B.

5.h Sample Calculations

Sample calculations are provided as Appendix C.

5.i Field Data Sheets

Field data sheets are provided in Appendix D.

5.j Laboratory Data

Laboratory analysis is provided in Appendix E.

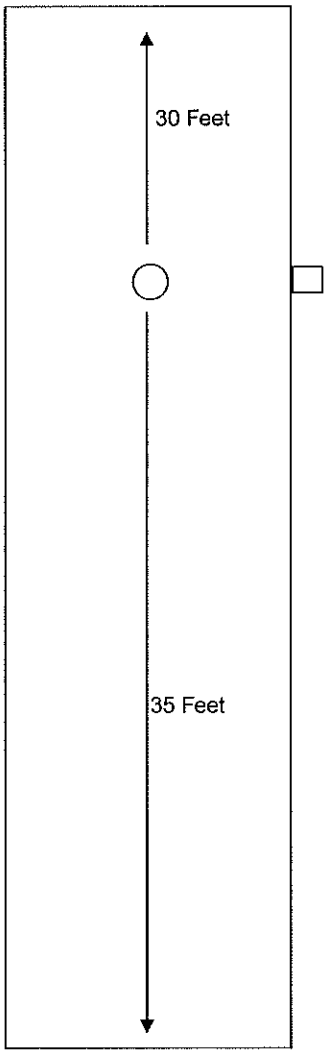
Table 4
EUCOPELAND+DISTANK Particulate Matter Emission Rates

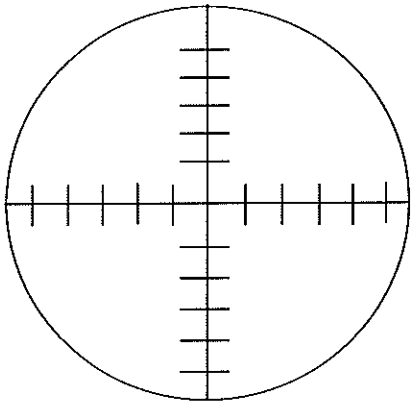
Company	**PCA**			
Source Designation	**Copeland Reactor**			
Test Date	**9/17/2015**	**9/17/2015**	**9/17/2015**	
Meter/Nozzle Information	Run 1	Run 2	Run 3	Average
Meter Temperature Tm (F)	70.7	80.9	87.3	79.6
Meter Pressure - Pm (in. Hg)	29.4	29.4	29.4	29.4
Measured Sample Volume (Vm)	41.7	45.1	43.0	43.3
Sample Volume (Vm-Std ft3)	40.6	43.2	40.6	41.5
Sample Volume (Vm-Std m3)	1.15	1.22	1.15	1.17
Condensate Volume (Vw-std)	32.156	40.313	38.427	36.966
Gas Density (Ps(std) lbs/ft3) (wet)	0.0636	0.0623	0.0622	0.0627
Gas Density (Ps(std) lbs/ft3) (dry)	0.0771	0.0771	0.0771	0.0771
Total weight of sampled gas (m g lbs) (wet)	4.63	5.20	4.92	4.92
Total weight of sampled gas (m g lbs) (dry)	3.13	3.33	3.13	3.20
Nozzle Size - An (sq. ft.)	0.000727	0.000727	0.000727	0.000727
Isokinetic Variation - I	94.8	105.5	106.4	102.2
Stack Data				
Average Stack Temperature - Ts (F)	371.7	432.3	452.3	418.7
Molecular Weight Stack Gas- dry (Md)	29.8	29.8	29.8	29.8
Molecular Weight Stack Gas-wet (Ms)	24.6	24.1	24.1	24.3
Stack Gas Specific Gravity (Gs)	0.850	0.833	0.832	0.838
Percent Moisture (Bws)	44.20	48.30	48.61	47.04
Water Vapor Volume (fraction)	0.4420	0.4830	0.4861	0.4704
Pressure - Ps ("Hg)	29.3	29.3	29.3	29.3
Average Stack Velocity -Vs (ft/sec)	47.3	52.3	50.2	49.9
Area of Stack (ft2)	33.6	33.6	33.6	33.6
Oxygen (%)	12.0	12.0	12.0	12.0
Carbon Dioxide (%)	8.5	8.5	8.5	8.5
Carbon Monoxide (%)	0.0	0.0	0.0	0.0
Nitrogen (%)	79.5	79.5	79.5	79.5
% Excess Air	133.5	133.5	133.5	133.5
Exhaust Gas Flowrate				
Flowrate ft^3(Actual)	95,257	105,395	101,128	100,593
Flowrate ft^3 (Standard Wet)	59,140	60,987	57,238	59,121
Flowrate ft^3 (Standard Dry)	33,000	31,531	29,412	31,314
Flowrate m^3 (standard dry)	934	893	833	887
Total Particulate Weights (mg)				
Nozzle/Probe/Filter	34.9	59.6	61.9	52.1
Total Particulate Concentration				
lb/1000 lb (wet)	0.017	0.025	0.028	0.023
lb/1000 lb (wet) corrected to 50% Excess Air	0.022	0.032	0.035	0.030
lb/1000 lb (dry)	0.025	0.039	0.044	0.036
mg/dscm (dry)	30.4	48.8	53.8	44.3
gr/dscf	0.0133	0.0213	0.0235	0.0194
Total Particulate Emission Rate				
lb/ hr	3.77	5.78	5.95	5.17

Figures

BTEC Inc.

diameter = 78.5 inches





Not to Scale

Points	Distance "
1	2.04
2	6.44
3	11.46
4	17.74
5	26.85
6	51.65
7	60.76
8	67.04
9	72.06
10	76.46

Figure No. 1

Site: **EUCOPELAND+DISTANK Exhaust** **PCA** **Filer City, Michigan**	**Sampling Date:** **September 17, 2015**	**BT Environmental Consulting, Inc.** **4949 Fernlee** **Royal Oak, Michigan**

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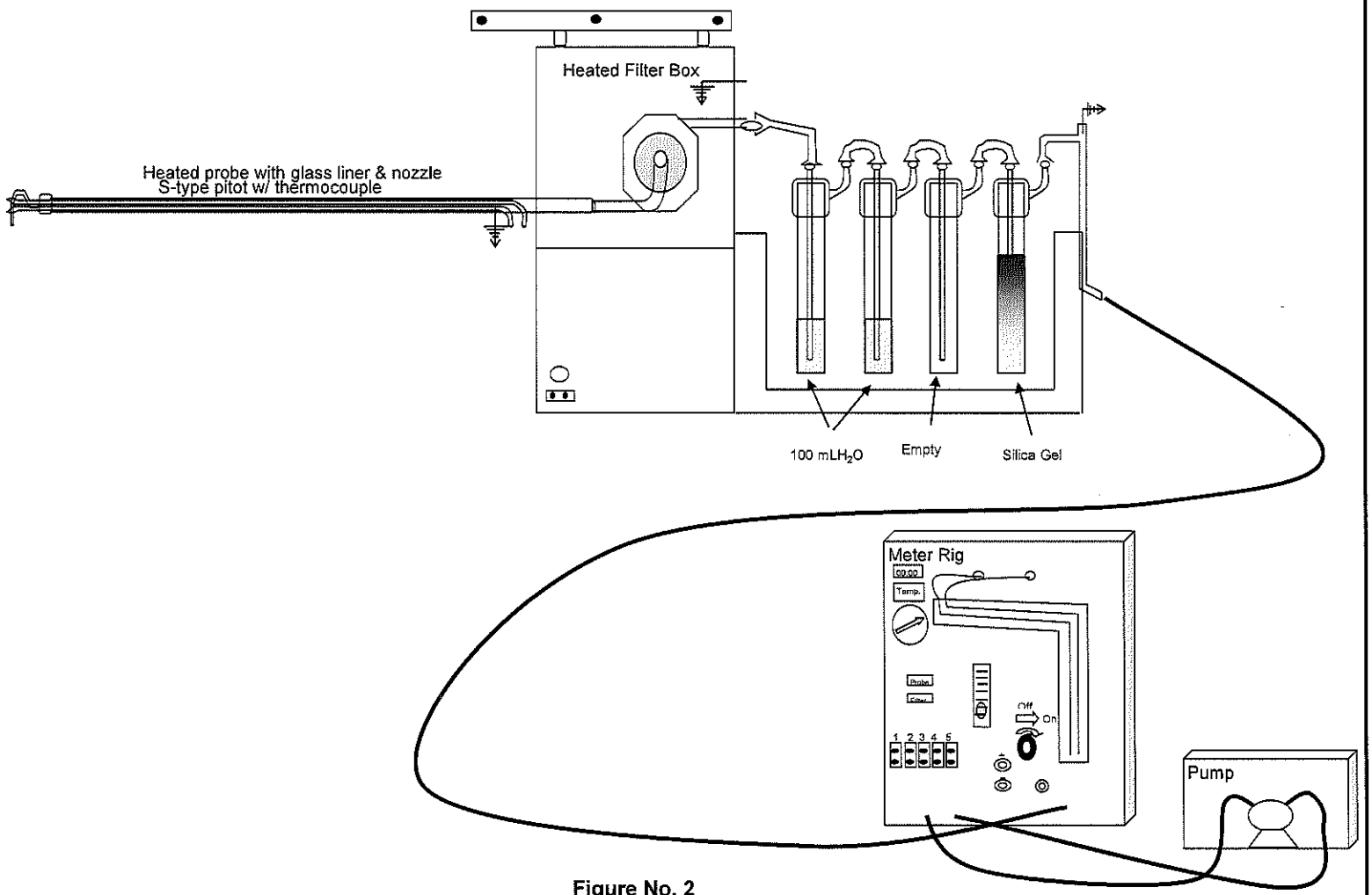

Figure No. 2

Site: **USEPA Method 5** **PCA** **Filer City, Michigan**	**Sampling Date:** **September 17, 2015**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**