



**Boiler No. 2 Oxides of Nitrogen
Relative Accuracy Test Audit
Emissions Test Report
Test Date: July 29, 2015**

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AIR QUALITY DIV.

Prepared for:

Packaging Corporation of America

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

Project No. 15-4738.00
August 17, 2015

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



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RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION

AIR QUALITY DIV.

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-B3692-2015 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:
July 29, 2015 RATA Report: Boiler 2

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 8/14/15
Signature of Responsible Official Date

EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by Packaging Corporation of America (PCA) to conduct a relative accuracy test audit (RATA) of the continuous emission monitoring systems serving Boiler 2 located at the PCA facility in Filer City, Michigan. This emissions testing program included evaluation of oxides of nitrogen (NO_x) and oxygen (O₂) concentrations and corresponding NO_x emission rates (lb/MMBtu) on EUBOILER2 at a single load while firing natural gas.

Pursuant to Title 40, Part 60, Appendix B, Performance Specification 2, the relative accuracy of the Boiler 2 CEMS must remain less than 20%. Table I summarizes the results of the test program.

Table I
Test Results Summary

Test Date	Unit	Parameter	Result
7/29/15	Boiler 2	NO _x (lb/MMBtu)	3.7% RA
		NO _x (ppmv)	4.9% RA

In addition, the 7-day calibration drift test required by Performance Specification 2 was conducted by PCA. The results of the 7-day drift test are summarized in Appendix G.

AUG 24 2015

AIR QUALITY DIV.

1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Packaging Corporation of America (PCA) to conduct a relative accuracy test audit (RATA) of the continuous emission monitoring systems serving Boiler 2 located at the PCA facility in Filer City, Michigan. This emissions testing program included evaluation of oxides of nitrogen (NO_x) and oxygen (O₂) concentrations and corresponding NO_x emission rates (lb/MMBtu) on EUBOILER2 at a single load while firing natural gas.

In addition, the 7-day calibration drift test required by Performance Specification 2 was conducted by PCA. The results of the 7-day drift test are summarized in Appendix G.

AQD has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (December 2013). This document is provided as Appendix A. 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 relative accuracy of the CEM systems serving PCA Boiler No. 2 was evaluated. The CEM system monitors and records the concentration of oxides of nitrogen (NO_x) and oxygen (O₂) in the boiler exhaust gas and then calculates the resultant NO_x emission rate (in terms of pounds per million Btu heat input, lbs/MMBtu). The relative accuracy of the CEM system was verified in terms of NO_x emission rate (lbs/MMBtu) and part per million (ppm).

The CEM system is located at PCA (2246 Udell Street, Filer City, Michigan). Testing of Boiler No. 2 CEM systems was conducted on July 29, 2015.

1.b Purpose of Testing

The purpose of the testing was to verify the relative accuracy of the CEM system. Boiler No. 2 is affected by the requirements of Title 40, Part 60, Appendix B, Performance Specification 2, the relative accuracy of the Boiler 2 CEMS must remain less than 20%.

1.c Source Description

Boiler No. 2 has a maximum heat input rating of 186 MMBtu/hr. The boiler has the capability to burn coal, natural gas, biogas, and No. 6 fuel oil. The exhaust is controlled by a baghouse when burning coal and can bypass the baghouse when both EUBOILER1 and EUBOILER2 have ceased firing coal.



1.d Test Program Contact

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

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

1.e Testing Personnel

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

**Table 1
Testing Personnel**

Name	Affiliation
Sara Kaltunas	PCA
Jeremy Howe	MDEQ-AQD
Todd Wessel	BTEC
Shane Rabideau	BTEC



2. Summary of Results

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

2.a Operating Data

Natural gas flowrate (scf/hr) as well as NO_x and O₂ concentrations were monitored throughout the RATA emissions test program. The data is presented in Appendix F.

2.b Applicable Permit

Boiler No. 2 is covered by AQD Renewable Operating Permit No. MI-ROP-B3692-2015.

2.c Results

The results of the RATA emissions test program for Boiler No. 2 are summarized by Table 2. In addition, the 7-day calibration drift test required by Performance Specification 2 was conducted by PCA. The results of the 7-day drift test are summarized in Appendix G.

2.d Emission Regulation Comparison

The boiler is affected by the requirements of Title 40, Part 60, Subpart Db of the Code of Federal Regulations (40 CFR 60, Subpart Db) which require that NO_x emissions be continuously monitored by installing, maintaining, and operating a continuous emission monitoring (CEM) system and that the relative accuracy of each CEM system be verified on, at a minimum, an annual basis. The RA limit is 20%. The RA of the boiler CEM systems mass emission rate is 3.7%. The RA of the boiler CEM NO_x ppmv is 4.9%.

3. Source Description

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

3.a Process Description

Boiler 2:

Boiler No. 2 has a maximum heat input rating of 186 MMBtu/hr. The boiler has the capability to burn coal, natural gas, biogas, and No. 6 fuel oil. The exhaust is controlled by a baghouse when burning coal and can bypass the baghouse when both EUBOILER1 and EUBOILER2 have ceased firing coal.

3.b Process Flow Diagram

Due to the simplicity of the boiler process, a process flow diagram is not necessary.



3.c Raw and Finished Materials

The raw materials used by the boilers include natural gas and water and the product is steam.

3.d Process Capacity

Boiler No. 2 has a maximum heat input rating of 186 MMBtu/hr.

3.e Process Instrumentation

Natural gas flowrate (scf/hr) as well NO_x and O₂ concentrations were monitored throughout the RATA emissions test program. The data is presented in Appendix F.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used to verify the relative accuracy of Boiler No. 2 CEM system.

4.a Sampling Train and Field Procedures

The NO_x concentration of the exhaust gas was measured using a TECO 42i NO_x gas analyzer (Serial No. 1032645647) and the O₂ content was measured using a Servomex 1400 O₂ gas analyzer (Serial No. 1420B/894). A sample of the gas stream was drawn through an insulated stainless-steel probe with an in-line glass fiber filter to remove any particulate, a heated Teflon[®] sample line, and through a refrigerated Teflon[®] impinger train with a peristaltic pump to remove the moisture from the sample before it enters the analyzer. Data was recorded at 10-second intervals on an IBM PC equipped with data acquisition software.

Sampling and analysis procedures followed the requirements of 40 CFR 60, Appendix B, PS2.

4.b Recovery and Analytical Procedures

Because all measurements were conducted using on-line analyzers, no samples were recovered during the test program.

4.c Sampling Ports

During the first test run on Boiler 2, a stratification test was conducted out of the existing three sample ports. Sampling was subsequently conducted at three points (16.7%, 50%, 83.3%) in a single sampling port.



4.d Traverse Points

During the first test run on Boiler 2, a twelve-point stratification test was conducted and sampling was subsequently conducted at a three sampling points in a single sampling port.

5. Test Results and Discussion

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

5.a Results Tabulation

The results of the RATA emissions test program for Boiler No. 2 is summarized in Appendix B. Relevant raw test data for emissions test runs and for analyzer calibrations are provided electronically in Appendix C.

5.b Discussion of Results

The boiler is affected by the requirements of Title 40, Part 60, Subpart Db of the Code of Federal Regulations (40 CFR 60, Subpart Db) which require that NO_x emissions be continuously monitored by installing, maintaining, and operating a continuous emission monitoring (CEM) system and that the relative accuracy of each CEM system be verified on, at a minimum, an annual basis. The RA limit is 20%. The RA of the boiler CEM system was 3.7%.

5.c Sampling Procedure Variations

There were not any variations in the sampling procedures.

5.d Process or Control Device Upsets

No upset conditions occurred during testing.

5.e Control Device Maintenance

Only routine maintenance was performed on Boiler 2 prior to the emissions test program.

5.f Re-Test Changes

The emissions test program was a re-test due to replacing the old NO_x analyzer.

5.g Audit Sample Analyses

No audit samples were requested by AQD.



5.h Calibration Sheets

Certificates of analysis for the calibration gases used during testing are provided as Appendix D.

5.i Sample Calculations

Sample calculations are provided as Appendix E.

5.j Field Data Sheets

Copies of field data sheets and relevant field notes are provided as Appendix D.

5.k Laboratory Data

No laboratory analysis was included in this test program.

TABLE 2
SUMMARY OF NO_x Lb/MMBTU RATA RESULTS (O₂)
July 29, 2015
PACKAGING CORPORATION OF AMERICA
BOILER No. 2

NO_x Lb/MMBtu Relative Accuracy					
Relative Accuracy:			3.7		
Run #	Time	RM Lb/MMBtu	CEM Lb/MMBtu	Diff	%Diff
1	9:55-10:28	0.0909	0.0900	0.0009	0.01
2	10:38-10:58	0.0922	0.0900	0.0022	0.02
3	11:11-11:31	0.0964	0.0940	0.0024	0.02
4	12:07-12:27	0.0999	0.0970	0.0029	0.03
5	12:39-12:59	0.1019	0.0980	0.0039	0.04
6	13:14-13:34	0.1041	0.1010	0.0031	0.03
7	13:46-14:06	0.1035	0.1000	0.0035	0.03
8	14:20-14:40	0.1038	0.1000	0.0038	0.04
9	14:52-15:12	0.1057	0.1020	0.0037	0.04
10	15:23-15:43	0.1072	0.1020	0.0052	0.05
11	0	0.0000	0.0000	0.0000	#DIV/0!
12	0	0.0000	0.0000	0.0000	#DIV/0!
		0.100	0.097	0.003	0.029
		Sdev	0.0010		
		CC	0.0007		
		RA (based on Ref. Meth.)	3.7%		
		Bias Adjustment Factor	1.030		

Confidence Coefficient = $CC = t_{0.975} \frac{S_d}{\sqrt{n}}$ P.S. 2 Equation 2-5
n=9
t= 2.306

Standard Deviation = $S_d = \left[\frac{\sum_{i=1}^n d_i^2 - \frac{(\sum_{i=1}^n d_i)^2}{n}}{n-1} \right]^{1/2}$ P.S. 2 Equation 2-4

Relative Accuracy = $RA = \frac{|d| + |cc|}{RM} \times 100$ P.S. 2 Equation 2-6
RM=Reference Monitor

RA calculated as specified in Performance Specification 2, Appendix B, 40 CFR 60 - Equation 2-4

As specified in P.S. 2, subsection 8.4.4, three sets of test runs may be rejected, these rejected test runs are high-lighted in the table

Used Method 19 Eq. 19-1

TABLE 3
SUMMARY OF NO_x PPM RATA RESULTS
July 29, 2015
PACKAGING CORPORATION OF AMERICA
BOILER No. 2

NO _x PPM Relative Accuracy					
Relative Accuracy:				4.9	
Run #	Time	RM NO _x PPM	CEM NO _x PPM	Diff	%Diff
1	9:55-10:28	62.7	61.4	1.32	0.02
2	10:38-10:58	64.3	61.8	2.48	0.04
3	11:11-11:31	66.6	64.4	2.16	0.03
4	12:07-12:27	68.4	65.9	2.48	0.04
5	12:39-12:59	70.9	67.8	3.07	0.04
6	13:14-13:34	72.7	69.1	3.64	0.05
7	13:46-14:06	71.8	68.7	3.09	0.04
8	14:20-14:40	72.7	68.8	3.87	0.05
9	14:52-15:12	73.4	70.1	3.29	0.04
10	15:23-15:43	69.2	70.4	-1.25	-0.02
11	0	0.0	0.0	0.00	#DIV/0!
12	0	0.0	0.0	0.00	#DIV/0!
		68.88	66.62	2.253	0.032
		Sdev	1.4841		
		CC	1.1408		
		RA (based on Ref. Meth.)	4.9%		

Confidence Coefficient = $CC = \frac{t}{0.975} \frac{S_d}{\sqrt{n}}$ P.S. 2 Equation 2-5
n=9
t= 2.306

Standard Deviation = $S_d = \left[\frac{\sum_{i=1}^n d_i^2 - \frac{(\sum d_i)^2}{n}}{n-1} \right]^{1/2}$ P.S. 2 Equation 2-4

Relative Accuracy = $RA = \frac{|\bar{d}| + |cc|}{RM} \times 100$ P.S. 2 Equation 2-6
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RA calculated as specified in Performance Specification 2, Appendix B, 40 CFR 60 - Equation 2-4

As specified in P.S. 2, subsection 8.4.4, three sets of test runs may be rejected, these rejected test runs are high-lighted in the table

Part 60 Requires +/- 20% RA, Part 75 Requires +/- 12 PPM



**Boiler No. 2 Oxides of Nitrogen
Relative Accuracy Test Audit
Emissions Test Report
Test Date: July 29, 2015**

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Prepared for:

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Source Address 2246 Udell Street City Filer City

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

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July 29, 2015 RATA Report: Boiler 2

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
<u>Robert J. Peretin</u>	<u>MILL MANAGER</u>	<u>8/14/15</u>
Signature of Responsible Official		Date



EXECUTIVE SUMMARY

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Pursuant to Title 40, Part 60, Appendix B, Performance Specification 2, the relative accuracy of the Boiler 2 CEMS must remain less than 20%. Table I summarizes the results of the test program.

Table I
Test Results Summary

Test Date	Unit	Parameter	Result
7/29/15	Boiler 2	NOx (lb/MMBtu)	3.7% RA
		NOx (ppmv)	4.9% RA

In addition, the 7-day calibration drift test required by Performance Specification 2 was conducted by PCA. The results of the 7-day drift test are summarized in Appendix G.

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1.a Identification, Location, and Dates of Test

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The CEM system is located at PCA (2246 Udell Street, Filer City, Michigan). Testing of Boiler No. 2 CEM systems was conducted on July 29, 2015.

1.b Purpose of Testing

The purpose of the testing was to verify the relative accuracy of the CEM system. Boiler No. 2 is affected by the requirements of Title 40, Part 60, Appendix B, Performance Specification 2, the relative accuracy of the Boiler 2 CEMS must remain less than 20%.

1.c Source Description

Boiler No. 2 has a maximum heat input rating of 186 MMBtu/hr. The boiler has the capability to burn coal, natural gas, biogas, and No. 6 fuel oil. The exhaust is controlled by a baghouse when burning coal and can bypass the baghouse when both EUBOILER1 and EUBOILER2 have ceased firing coal.



1.d Test Program Contact

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

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

1.e Testing Personnel

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

**Table 1
Testing Personnel**

Name	Affiliation
Sara Kaltunas	PCA
Jeremy Howe	MDEQ-AQD
Todd Wessel	BTEC
Shane Rabideau	BTEC

2. Summary of Results

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

2.a Operating Data

Natural gas flowrate (scf/hr) as well as NO_x and O₂ concentrations were monitored throughout the RATA emissions test program. The data is presented in Appendix F.

2.b Applicable Permit

Boiler No. 2 is covered by AQD Renewable Operating Permit No. MI-ROP-B3692-2015.

2.c Results

The results of the RATA emissions test program for Boiler No. 2 are summarized by Table 2. In addition, the 7-day calibration drift test required by Performance Specification 2 was conducted by PCA. The results of the 7-day drift test are summarized in Appendix G.

2.d Emission Regulation Comparison

The boiler is affected by the requirements of Title 40, Part 60, Subpart Db of the Code of Federal Regulations (40 CFR 60, Subpart Db) which require that NO_x emissions be continuously monitored by installing, maintaining, and operating a continuous emission monitoring (CEM) system and that the relative accuracy of each CEM system be verified on, at a minimum, an annual basis. The RA limit is 20%. The RA of the boiler CEM systems mass emission rate is 3.7%. The RA of the boiler CEM NO_x ppmv is 4.9%.

3. Source Description

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

3.a Process Description

Boiler 2:

Boiler No. 2 has a maximum heat input rating of 186 MMBtu/hr. The boiler has the capability to burn coal, natural gas, biogas, and No. 6 fuel oil. The exhaust is controlled by a baghouse when burning coal and can bypass the baghouse when both EUBOILER1 and EUBOILER2 have ceased firing coal.

3.b Process Flow Diagram

Due to the simplicity of the boiler process, a process flow diagram is not necessary.



3.c Raw and Finished Materials

The raw materials used by the boilers include natural gas and water and the product is steam.

3.d Process Capacity

Boiler No. 2 has a maximum heat input rating of 186 MMBtu/hr.

3.e Process Instrumentation

Natural gas flowrate (scf/hr) as well NO_x and O₂ concentrations were monitored throughout the RATA emissions test program. The data is presented in Appendix F.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used to verify the relative accuracy of Boiler No. 2 CEM system.

4.a Sampling Train and Field Procedures

The NO_x concentration of the exhaust gas was measured using a TECO 42i NO_x gas analyzer (Serial No. 1032645647) and the O₂ content was measured using a Servomex 1400 O₂ gas analyzer (Serial No. 1420B/894). A sample of the gas stream was drawn through an insulated stainless-steel probe with an in-line glass fiber filter to remove any particulate, a heated Teflon[®] sample line, and through a refrigerated Teflon[®] impinger train with a peristaltic pump to remove the moisture from the sample before it enters the analyzer. Data was recorded at 10-second intervals on an IBM PC equipped with data acquisition software.

Sampling and analysis procedures followed the requirements of 40 CFR 60, Appendix B, PS2.

4.b Recovery and Analytical Procedures

Because all measurements were conducted using on-line analyzers, no samples were recovered during the test program.

4.c Sampling Ports

During the first test run on Boiler 2, a stratification test was conducted out of the existing three sample ports. Sampling was subsequently conducted at three points (16.7%, 50%, 83.3%) in a single sampling port.



4.d Traverse Points

During the first test run on Boiler 2, a twelve-point stratification test was conducted and sampling was subsequently conducted at a three sampling points in a single sampling port.

5. Test Results and Discussion

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

5.a Results Tabulation

The results of the RATA emissions test program for Boiler No. 2 is summarized in Appendix B. Relevant raw test data for emissions test runs and for analyzer calibrations are provided electronically in Appendix C.

5.b Discussion of Results

The boiler is affected by the requirements of Title 40, Part 60, Subpart Db of the Code of Federal Regulations (40 CFR 60, Subpart Db) which require that NO_x emissions be continuously monitored by installing, maintaining, and operating a continuous emission monitoring (CEM) system and that the relative accuracy of each CEM system be verified on, at a minimum, an annual basis. The RA limit is 20%. The RA of the boiler CEM system was 3.7%.

5.c Sampling Procedure Variations

There were not any variations in the sampling procedures.

5.d Process or Control Device Upsets

No upset conditions occurred during testing.

5.e Control Device Maintenance

Only routine maintenance was performed on Boiler 2 prior to the emissions test program.

5.f Re-Test Changes

The emissions test program was a re-test due to replacing the old NO_x analyzer.

5.g Audit Sample Analyses

No audit samples were requested by AQD.



5.h Calibration Sheets

Certificates of analysis for the calibration gases used during testing are provided as Appendix D.

5.i Sample Calculations

Sample calculations are provided as Appendix E.

5.j Field Data Sheets

Copies of field data sheets and relevant field notes are provided as Appendix D.

5.k Laboratory Data

No laboratory analysis was included in this test program.

TABLE 2
SUMMARY OF NO_x Lb/MMBTU RATA RESULTS (O₂)
July 29, 2015
PACKAGING CORPORATION OF AMERICA
BOILER No. 2

NO_x Lb/MMBtu Relative Accuracy					
Relative Accuracy:			3.7		
Run #	Time	RM Lb/MMBtu	CEM Lb/MMBtu	Diff	%Diff
1	9:55-10:28	0.0909	0.0900	0.0009	0.01
2	10:38-10:58	0.0922	0.0900	0.0022	0.02
3	11:11-11:31	0.0964	0.0940	0.0024	0.02
4	12:07-12:27	0.0999	0.0970	0.0029	0.03
5	12:39-12:59	0.1019	0.0980	0.0039	0.04
6	13:14-13:34	0.1041	0.1010	0.0031	0.03
7	13:46-14:06	0.1035	0.1000	0.0035	0.03
8	14:20-14:40	0.1038	0.1000	0.0038	0.04
9	14:52-15:12	0.1057	0.1020	0.0037	0.04
10	15:23-15:43	0.1072	0.1020	0.0052	0.05
11	0	0.0000	0.0000	0.0000	#DIV/0!
12	0	0.0000	0.0000	0.0000	#DIV/0!
		0.100	0.097	0.003	0.029
		Sdev	0.0010		
		CC	0.0007		
		RA (based on Ref. Meth.)	3.7%		
		Bias Adjustment Factor	1.030		

Confidence Coefficient =
n=9
t = 2.306

$$CC = t_{\alpha, n-1} \frac{S_d}{\sqrt{n}}$$

P.S. 2 Equation 2-5

Standard Deviation =

$$S_d = \left[\frac{\sum_{i=1}^n d_i^2 - \frac{(\sum_{i=1}^n d_i)^2}{n}}{n-1} \right]^{1/2}$$

P.S. 2 Equation 2-4

Relative Accuracy =
RM=Reference Monitor

$$RA = \frac{|d| + |cc|}{RM} \times 100$$

P.S. 2 Equation 2-6

RA calculated as specified in Performance Specification 2, Appendix B, 40 CFR 60 - Equation 2-4

As specified in P.S. 2, subsection 8.4.4, three sets of test runs may be rejected, these rejected test runs are high-lighted in the table

Used Method 19 Eq. 19-1

TABLE 3
SUMMARY OF NO_x PPM RATA RESULTS
July 29, 2015
PACKAGING CORPORATION OF AMERICA
BOILER No. 2

NO _x PPM Relative Accuracy					
Relative Accuracy:				4.9	
Run #	Time	RM NO _x PPM	CEM NO _x PPM	Diff	%Diff
1	9:55-10:28	62.7	61.4	1.32	0.02
2	10:38-10:58	64.3	61.8	2.48	0.04
3	11:11-11:31	66.6	64.4	2.16	0.03
4	12:07-12:27	68.4	65.9	2.48	0.04
5	12:39-12:59	70.9	67.8	3.07	0.04
6	13:14-13:34	72.7	69.1	3.64	0.05
7	13:46-14:06	71.8	68.7	3.09	0.04
8	14:20-14:40	72.7	68.8	3.87	0.05
9	14:52-15:12	73.4	70.1	3.29	0.04
10	15:23-15:43	69.2	70.4	-1.25	-0.02
11	0	0.0	0.0	0.00	#DIV/0!
12	0	0.0	0.0	0.00	#DIV/0!
		68.88	66.62	2.253	0.032
			Sdev	1.4841	
			CC	1.1408	
			RA (based on Ref. Meth.)	4.9%	

Confidence Coefficient =
n=9
t=2.306

$$CC = t_{n-1, 0.975} \frac{S_d}{\sqrt{n}}$$

P.S. 2 Equation 2-5

Standard Deviation =

$$S_d = \left[\frac{\sum_{i=1}^n d_i^2 - \frac{(\sum_{i=1}^n d_i)^2}{n}}{n-1} \right]^{1/2}$$

P.S. 2 Equation 2-4

Relative Accuracy =
RM=Reference Monitor

$$RA = \frac{|\bar{d}| + |cc|}{RM} \times 100$$

P.S. 2 Equation 2-6

RA calculated as specified in Performance Specification 2, Appendix B, 40 CFR 60 - Equation 2-4

As specified in P.S. 2, subsection 8.4.4, three sets of test runs may be rejected, these rejected test runs are high-lighted in the table

Part 60 Requires +/- 20% RA, Part 75 Requires +/- 12 PPM

Figures

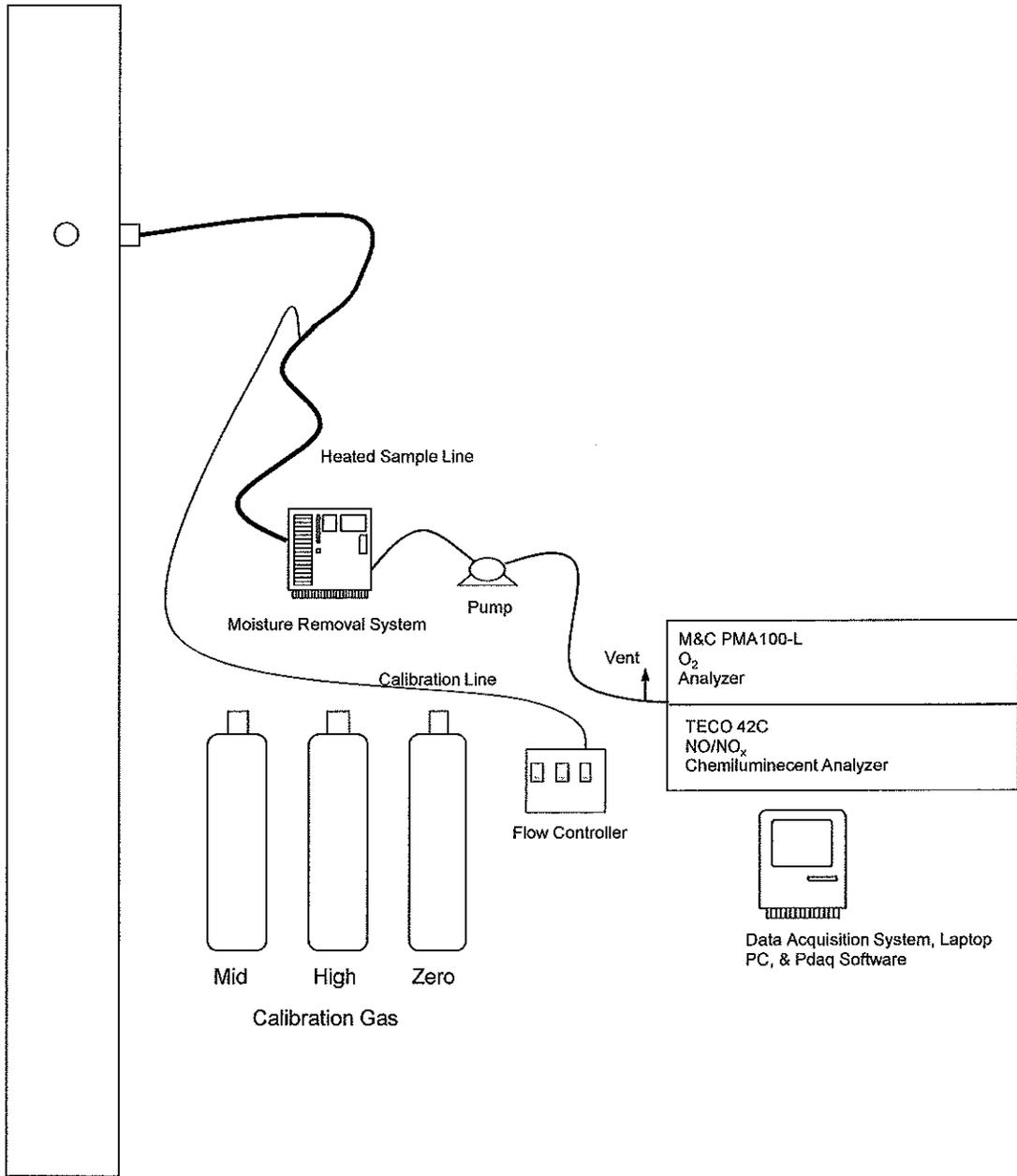


Figure No. 1

Site:
USEPA Method 3A and 7E
PCA
Filer City, Michigan

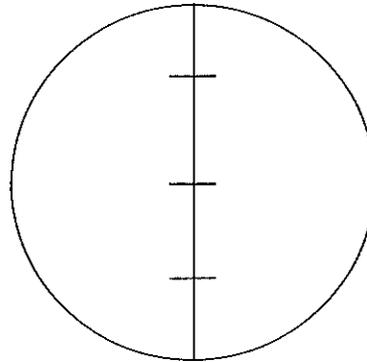
Sampling Date:
July 29, 2015

BT Environmental Consulting Inc.
4949 Fernlee Avenue
Royal Oak, MI 48073



diameter = 48 inches

Points	Distance "
1	8.0
2	24.0
3	40.0



Not to Scale

Note: NO_x/O₂ sampling will be extracted at three points through a stainless steel probe positioned at approximately 16.7%, 50% and 83.3% of the sample stream diameter (7 minutes at each point).

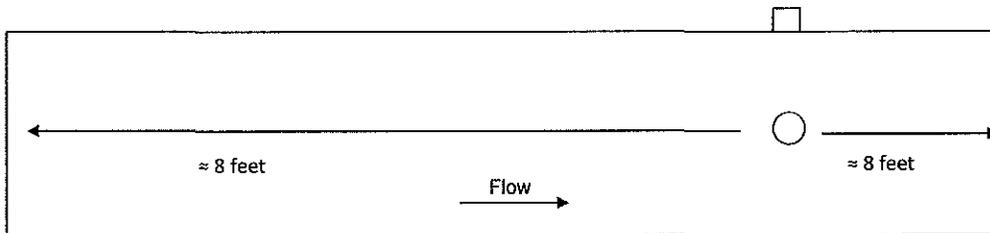


Figure No. 2

Site:
EUBOILER2 Exhaust
Packaging Corporation of America
Filer City, Michigan

Sampling Date:
July 29, 2015

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073